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STANDARD CHLORINE CHEMICAL COMPANY SUPERFUND SITE

NORTHEASTERN AREA BUILDINGS WORK PLAN FOR CLOSURE OF BUILDING OPENINGS

Prepared for:

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June 2010

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ACRONYMS

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

EPA United States Environmental Protection Agency

HASP Health and Safety Plan

HAZWOPER Hazardous Waste Operations and Emergency Response System

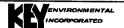
IRA Interim Response Action
NCP National Contingency Plan
NPL National Priority List

PPE Personal Protective Equipment

RCRA Resource Conservation and Recovery Act.

RSE Removal Site Evaluation

SCCC Standard Chlorine Chemical Co., Inc. TSD Treatment, Storage, and Disposal



1.0 INTRODUCTION

This work plan (Work Plan) for closure of the building openings on the northeastern portion of the Standard Chlorine Chemical Company, Inc. Superfund Site (Site) has been prepared in response to Paragraph 45 of the Administrative Settlement Agreement and Order on Consent for Removal Action (Order), dated June 7, 2010 between Region 2 of the United States Environmental Protection Agency (EPA) and Standard Chlorine Chemical Co., Inc. (SCCC) and Beazer East, Inc. (Beazer) (SCCC and Beazer are collectively referred to hereafter as the "Respondents"). The SCCC Superfund Site is located at 1025 to 1035 Belleville Turnpike, Kearny, New Jersey and occupies approximately 25-acres identified on the Town of Kearny Tax Map as Block 287, Lots 48, 49, 50, 51, 52, and 52.01. Figure 1 is a Site Location Map showing the general location of the Site.

From 1916 until 1993, the Site was the location of various chemical manufacturing operations. Based on the historical use of several dioxin precursor chemicals at the Site, between 1985 and 1988, EPA and SCCC undertook a dioxin investigation at the Site. In October 1989, SCCC and the New Jersey Department of Environmental Protection (NJDEP) executed an Administrative Consent Order (the SCCC ACO) under which SCCC agreed to undertake certain interim remedial measures, and the investigation and remediation of the Site. Since that time, various remedial investigations and interim remedial measures have been implemented at the Site under the SCCC ACO. In April 2003, EPA proposed adding the Site to the National Priorities List (NPL) established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601 et seq. The Site subsequently was added to the NPL in September 2007.

Pursuant to the ACO, an Interim Response Action Workplan (IRAW) for the Site was approved by the NJDEP on March 31, 2008, and activities identified therein are scheduled to be completed in 2010. Components of the Interim Response Actions under the IRAW include:

- Installation of a perimeter subsurface groundwater barrier slurry wall and sheet pile wall system around the perimeter of the Site and the adjacent Diamond Site, which will require demolition of the eastern-most building on the Site;
- Removal of soft ditch and near shore river sediments with placement on-Site in an Area of Contamination;
- Installation of a cover in certain areas on-Site:
- Recovery of dense non-aqueous phase liquids from certain subsurface lithologic units;
- Construction and operation of a hydraulic control and groundwater treatment system to maintain hydraulic control within the subsurface barrier wall limits; and,
- Certain other pertinent remedial activities.

EPA Region 2's Removal Assessment and Enforcement Section conducted a Removal Site Evaluation (RSE) at the Site on April 8, 2008 and documented its findings in an RSE Memorandum dated January 27, 2009. The Order was entered to address the removal action proposed in the RSE.



Seven (7) buildings located in the 2.32 acre northeastern corner of the site and identified Block 287, Lot 49 (the "Northeastern Area") the northeastern area of the Site are the subject of the Order and this Work Plan. Lot 49 and part of Lot 52 are enclosed by a barbed wired fence covered with a wind screen. Figure 2 is a Building Location Map showing the location of the Northeastern Area and the seven (7) buildings therein with reference numbers.

According to the RSE memorandum, EPA has determined that a removal action is warranted to address the 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) contamination that has been documented to exist within the former distillation buildings located on the Northeastern Area of the Site. An actual or potential release of hazardous substances from the Northeastern Area of the Site may exist, resulting from the potential for local air currents flowing through openings in certain buildings to cause migration of dust; therefore, there is the potential for certain open buildings to present an imminent and substantial endangerment to the public health, welfare, or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. §Section 9606(a). The Order requires closing and sealing the openings in such buildings. Under the Order, compliance with the terms of the Order will be deemed consistent with the NCP.

1.1 WORK PLAN ORGANIZATION

The Work Plan has been organized into several sections, tables, figures, and appendices. An Acronym sections is also provided. Following this section are six more sections as follows: Section 2.0 provides definitions or parameters used throughout the document; Section 3.0 identifies the project objectives; Section 4.0 describes the Buildings in the Northeastern Area in further detail; Section 5.0 presents the detailed scope of work; Section 6.0 presents the implementation schedule; and Section 7.0 discusses reporting requirements. One table, four figures, and two appendices also support the Work Plan.



2.0 **DEFINITIONS**

The following definitions apply to terms used in this Work Plan. Defined words are capitalized throughout the text.

"Doors" are building access openings such as typical man-doors, double man doors, and garage doors.

"Northeastern Area" is the area within the inner fenced area of Lot 49 shown on Figure 2. This area contains seven buildings identified as Building 15, 16, 17, 18, 19, 20, and 21. The "Northeastern Area" and "Exclusion Area" occupy a similar footprint on Lot 49.

"Exclusion Area" is the area within the inner fenced area of Lot 49 shown on Figure 2 on the Northeastern Area of the Site. As such, and with the exception of small operational and decontamination zones near the access gates, the "Exclusion Area," and "Northeastern Area," occupy a similar footprint and are further detailed in the Project-Specific Health and Safety Plan.

"Openings" are Doors, Windows, and roof Openings.

"Roof Openings" are openings in roofs created by the previous removal of tanks or silos.

"Warning Signs" are site-specific signs consistent with the signage requirements of Appendix A of the SCCC ACO which state:

"Danger-Hazardous Area - Unauthorized Persons Keep Out"

"Windows" are any opening that contains, or was designed to contain panes of glass. Frames may be steel, masonry, or wood depending on the structure.



3.0 OBJECTIVES

The Order addresses activities at the Site that are designed to:

- Reduce the potential threat of direct contact with harmful chemicals, if any, that may be present within Northeastern Area buildings;
- Minimize the potential for off-site migration of constituents from buildings in the Northeastern Area; and,
- Minimize the potential for exposure to on-Site and off-Site workers, Site visitors, and potential trespassers to any Site-related chemicals that may be within the Northeast Area buildings.

The objective of this Work Plan is to provide details and a plan for addressing these concerns by:

- Closing Openings that might allow an individual trespasser to access the interior of the buildings;
- Securing Openings to reduce potential wind currents from blowing through the buildings to minimize any probability of dust transport;
- Verifying or repairing existing fencing to ensure it is structurally sound to reduce the potential for trespass; and,
- Verifying the presence of Warning Signs along the fencing, and where otherwise appropriate.

When these objectives are achieved and the work is completed as stated herein, the Respondents will submit a Final Report under the Order. Upon approval of that Final Report by EPA the terms of the Order will be achieved. In order to ensure the continued integrity of measures proposed in the Work Plan, the Respondents are agreeing by separate letter to EPA to include the assessment and maintenance of these building opening closure actions in the routine quarterly reports (Quarterly Reports) provided to the NJDEP pursuant to the SCCC ACO. Copies of the Quarterly Reports are provided to EPA.



4.0 BUILDING DESCRIPTIONS

The seven (7) buildings within the Northeastern Area are identified as Buildings 15, 16, 17, 18, 19, 20, and 21 and are shown on Figure 2. With the exception of Building 18, all 7 buildings were used solely in naphthalene manufacturing operations. Building 18 was used first for the processing of crude naphthalene and later for the distillation of dichlorobenzenes and trichlorobenzene. The following paragraphs provide descriptions of the buildings, identify building Openings, address areas requiring attention, and discuss future activities and measures to be undertaken pursuant to the Order, where necessary. Table 1 summarizes the Openings identified in each building requiring building Opening closure. Photographs of the buildings are provided in Appendix A.

Building 15

Building 15 is a four to five story, transite-sided building located in the northwest portion of the Northeastern Area. The external stairwells and landings are in poor condition. Openings include approximately five man-doors, one double man-door, two garage doors, and 22 Windows. The Openings in this building will be addressed as discussed in Section 5.0 Scope of Work.

Building 16

Building 16 is 2-story, small, transite-sided open-ended (on two sides) building located to the south of Building 15. On the east open-end, portions of the siding are missing and a portion of the roof is no longer intact. (see photographs in Appendix A). The open ends of the building have supports for the roof, but do not have typical wall supports. This indicates that the building was designed to be open on each end. As shown in the photographs included as Appendix A, this building is currently empty and appears to have been constructed as an open-ended building without walls. Because the building is empty, small, has transite panels, does not have walls at the ends, or a complete roof, demolition is proposed rather than an effort to construct extensive walls and roof structures. Building 16 is included in plans for demolition of certain other Northeastern Area buildings (i.e., Buildings 19 and 20) as part of the IRA implementation activities which are required for construction of the barrier wall system. This work is scheduled for third quarter of 2010.

Building 17

Building 17 is a 2-story brick and concrete building located south of Building 16. One large (>6-fit diameter) circular roof opening is present on the west side where a former vertical tank or silo was likely situated. The outside stairwell is in poor condition. Openings include: approximately six man-doors, one double door, one garage door, 13 windows, and a large roof Opening. The Openings in this building will be addressed as discussed in the Section 5.0 Scope of Work.



Building 18

Building 18 is the approximately 8-story, transite-sided, former distillation building located éast of Building 16 and Building 17. It is the tallest building in the Northeastern Area. Between approximately 1963 and 1981 Building 18 and the equipment within it was leased by Standard Naphthalene to SCCC for use in the distillation separation of dichlorobenzenes and trichlorobenzene. It is the only building at the Site to be used in chlorobenzenes processing. The distillation column and ancillary piping, tanks, and other equipment remain within the building. Openings for Building 18 include: approximately five man-doors, three double doors, and 48 windows. The Openings in this building will be addressed as discussed in Section 5.0 Scope of Work.

Buildings 19 and 20

Buildings 19 and 20 are 1½-story, cement block buildings located in the northeastern corner of the Site. Building 19 and the adjacent Building 20 were both constructed in the 1960s after a single larger building used in naphthalene manufacturing operations was destroyed in a fire. Buildings 19 and 20 also were utilized in the production of naphthalene products. The building is currently empty (see photographic documentation in Appendix A). Openings include approximately: three man-doors, one garage door, and approximately 57 windows.

Demolition of Building 20 is necessary to allow for the installation of a barrier wall system component of the IRA. In lieu of closing the Openings of this building, the Respondents propose to move forward with the requisite activities associated with demolition. Although demolition of Building 19 is not absolutely necessary to permit installation of the IRA barrier wall, demolition of this building is proposed since the demolition of its twin (Building 20) is required for implementation of the IRA. As discussed above, Building 16 will also be included in the planning and demolition activities to be completed under the IRAW. Respondents will move forward with the pre-requisite activities associated with demolition, and the demolition will be covered under the IRA implementation schedule. This work is scheduled for third quarter of 2010.

Building 21

Building 21 is a 2-story, transite-sided building with concrete floors and roof support. Building 21 is located east of Building 18. Openings include approximately three man-doors, four windows, and two large Roof Openings where former vertical tanks or silos were likely situated. The door and window Openings in this building will be addressed as discussed in the Section 5.0 Scope of Work. The large roof Openings have existing steel channels near the outside edge of the Openings. Closing these Openings may require removing a portion of the steel channels, covering the gap, or otherwise securing the material to the existing steel.



5.0 SCOPE OF WORK

This Scope of Work identifies tasks necessary to meet the project Objectives, including the methods for closure of the Openings, sign requirements, and other contractor requirements. Work will be completed in accordance with the project-specific Health and Safety Plan provided in Appendix B.

5.1 TASK OVERVIEW

The following administrative tasks, work tasks, and reporting tasks are identified.

Administrative Tasks

- Identify Project Coordinator to EPA
- Identify Contractor to EPA

Work Tasks

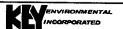
- Procure equipment and materials
- Mobilize to the Site
- Conduct HASP review and conduct safety meetings
- Define Exclusion Area(s)
- Verify perimeter fencing is intact and functional
- Define decontamination area(s)
- Verify Warning Sign requirements
- Clearing vegetation to provide access to the Northeastern Area buildings
- Close Openings on buildings
- Decontaminate equipment
- Demobilize

Reporting Tasks

- Submit bi-weekly progress reports to EPA
- Submit the Final Report to EPA

5.2 METHODS FOR COVERING OPENINGS

The method used to close and secure the building Openings is discussed herein and will be verified in the field at each location. The methods and/or materials may be field modified slightly based upon the conditions discovered and/or experienced during project implementation, as determined by field oversight personnel, and in conjunction with the EPA's On-Scene Coordinator. The Openings and the proposed individual covering details are shown on Figure 3 and detailed further below.



Man-Doors and Windows

Man-Door Openings will be closed using nominal ½-inch pine based plywood (i.e., min 15/32"), 2"x4"s (nominal) of appropriate length, and associated anchoring hardware. Typical details for closing Man-Door and Window Openings are shown on Figure 3 and discussed below.

Plywood shall be Grade C or higher. The higher grade face shall be placed facing outward. In general, it is expected that anchors will spaced on either side of the door into the plywood on a minimum 16-inch centers around the perimeter of the Opening. To increase the plywood longevity due to potential weathering, plywood panels and top edges shall be painted, preferably in advance of placement, using an appropriate colored latex outdoor paint.

5/16" diameter anchor bolts, lag screws or carriage bolts can be used in stainless, coated or galvanized materials. Coated ¼" deck screws can also be used and will be embedded into 2x4s for a minimum of 1.5 to 2 inches depending on orientation of the 2"x4". Fender washers with split lock washers shall be used behind the front face bolt head or screw head to provide additional purchase on the wood and to reduce potential for pull through. Nylon insert lock-nuts can also be used in lieu of split washers to resist vibration and loosening.

For masonry walls, 5/16" masonry anchors or 5/16" Tapcon, or equal, coated anchors can be used to anchor the plywood to the face of the building over the opening. Masonry anchors shall be installed to a minimum depth of 1.75-inches, installed a minimum of 2.5 inches from the opening, and be located 1.5 inches or more from the edge of the plywood. Plywood can be cut as necessary to fit the opening.

For transite sided buildings, 2"x4" nominal anchoring frames will likely need to be installed on the inside of the building against the existing door or window frame since drilling or anchoring to asbestos-containing transite siding is not recommended. In this instance, the door frame will be compressed on one side by the plywood, and the other side by the 2"x4". If this method is not appropriate or efficient, the 2"x4" may be anchored to the steel or wood frame with sheet metal screws or bolts, and then the plywood can be attached to the 2"x4"s in the manner and frequency described above. Anchors bolts or screws will need to be of sufficient length to span the door frame depth and penetrate the 2"x4" approximately 1.5 inches. Steel frames may need to be predrilled and screws shall be sunk a minimum of 3 thread rotations into the frame.

In some instances it will be more effective to mount the plywood to the inside frame (see Section 5.3.2). Similar anchoring off-sets will be used in these instances.

In order to provide for a proper closure of the opening and to reduce potential for wind transport into buildings, removal of the existing metal framing, doors, or window glass may be necessary to provide a relatively flush sheathing. In these cases, the material will be removed using power or hand tools and the material left inside the building near the opening for management during future demolition. Use of hard plastic sheeting, sheet metal, or fiberglass sheeting may be an option to cover Openings in certain situations. For instance metal siding material could possibly provide a light-weight alternative to plywood for closing an Opening on a transite building panel. **Double Door and Garage Doors**



Double Door and Garage Openings will be closed using nominal ½-inch plywood (15/32" or 17/32"), nominal 2"x4"s of appropriate length, and associated anchoring hardware. The materials and methods will be the same as for Man-Doors above, and additional 2"x4" framing wood will be provided in the vertical longitudinal direction and horizontally near the top and at the bottom of the opening when more than one 4'x8' sheet is required. Figure 3 shows a typical detail for double doors or garage doors. Framing boards may be nailed to each other into place with a minimum of four (4) framing nails per joint. The frequency of bolt or screw installation shall be approximately 16 inches on center or less along the longitudinal members and shall be anchored around the outside at a 16-inch-on-center minimum frequency. Plywood sheets shall be abutted to each other to provide limited air passage between the two boards. 2"x4"s shall be oriented with their long side perpendicular to the plywood sheet. Plywood shall be painted as described above.

Roof Openings

Buildings 17 and 21 have a total of three (3) Openings through the roof greater than 6-ft in diameter. The locations appear to be situated where former silos or vertical tanks were likely constructed. For these roof openings, nominal 2"x12" boards shall be installed on 16-inch centers over the Opening with a minimum 6-inches of overlap on the concrete, where applicable, or anchored to existing steel structures. The boards shall be anchored to end boards running perpendicular to the board spanning the opening. The longitudinal boards over the hole will be anchored through the end boards with galvanized or coated deck screws at a minimum of four locations per spanning board. Nominal ½-inch plywood (15/32" or 17/32") will be anchored on 16-inch centers to the 2"x12"s using fender washers and coated deck screws. Anchors shall be installed into the longitudinal members. A typical detail for covering a typical flat roof Opening is shown on Figure 3.

To help with potential weathering, a rubber roof material will be glued to the plywood to provide additional protection, and anchored every 16 inches on center using galvanized roofing nails with plastic washers.

Each assembly shall be anchor bolted at a minimum of four locations to the existing roof structure using galvanized steel reinforcements available for deck construction. 5/16-inch diameter anchor bolts shall be installed into the masonry to a minimum depth of 1.75-inches. Final means of anchoring shall be determined in the field based upon encountered conditions.

As the assemblies are being installed over the former silo or vertical tank locations, to keep the potential for short term wind transport through a building to a minimum and not for long term service as a structural roof, two signs shall be screwed to the top of each assembly that note "Danger – Unsafe" or "Keep off".

The Contractor will determine in the field whether the roof access will be achieved via ladders, internal or external building access, articulating boom lifts, scaffolding, or a combination of these methods. Roof Openings will be closed as described herein, unless Contractor safety concerns regarding the structural stability of the roof indicate that installing the Closure would be



unsafe and/or would jeopardize the health and safety its workers. In this event, the EPA on-Site Coordinator will be notified within 24-hours of this determination. This notification will be followed by a written request to EPA for approval outlining the proposed modification and its basis in accordance with Paragraph 70 of the Removal Order.

5.3 ADDITIONAL ISSUES AND CONSIDERATIONS

The following are additional considerations related to the project.

5.3.1 Signs

EPA has requested that Warning Signs be mounted around the perimeter of the Northeastern Area to warn passers-by. Warning Signs are required as part of Appendix A of the SCCC ACO to be placed on the fencing and at gates. SCCC will inspect the signs and replace any signs as required. Per the SCCC ACO, the signs shall be a minimum of 2-ft x 2-ft and made of plastic or a corrosion resistant material such as aluminum. The Warning Sign font shall be of sufficient size to be legible from a distance of 75-100 feet and located a maximum of 100-linear feet along the fence. Any Warning Signs that require replacement will be anchored to the fence with wire, stainless, galvanized, or brass hardware.

Per the SCCC ACO, the Warning Signs will state:

"Danger - Hazardous Area - Unauthorized Persons Keep Out"

5.3.2 Site Security, Access and Building Safety

The Site is currently secured with perimeter fencing and the perimeter fence partially surrounds the Northeastern Area. Three access gates in the perimeter fence are provided to the Site for vehicle access and remain chained and locked when Contractors are not on Site, and closed and chained when they are on Site. The Site access gates are/comprised of two, 6-feet wide or larger sections of chain link fencing attached by hinge to the gate posts. To increase safety and means of egress, the Contractor and oversight personnel will be provided keys to the front entry gate along Belleville Turnpike. Contractor, oversight and any delivery personnel will sign into a daily log. Any visitors or delivery personnel will not be allowed access into the Northeastern Area of the Site and/or the work zones. Access gates will be locked when personnel leave the Site and the equipment is secured at the end of each day.

The smaller Northeastern Area is also perimeter fenced, and two primary chain link fence gates are located along the north and western portion of the Northeastern Area perimeter fence (see Figure 2) which provide access to the buildings. Proximal to these two gates will be the safety zones. The Exclusion Zone will be the entire inner fenced area of the Northeastern Area (e.g., fencing covered with black plastic) except the support zones. A Decontamination Zone will be established at the northern gated entrance to the Exclusion Zone. Depending on the location of structures such as containment or former tank saddles which may limit access to certain buildings, an Exclusion Zone entrance may also be established at the western gated area. Access and egress into the Northeastern Area will be restricted to the north gate and/or the west gate.



To further limit the possibility of exposure to or transfer of any potentially contaminated substances, the number of personnel and equipment in the Northeastern Area will be minimized, operations and equipment usage will be conducted in such a manner as to reduce potential exposure (e.g., minimize dust generation), and appropriate decontamination procedures will be implemented. Equipment decontamination will be completed with a hot water pressurized wash and decontamination pad. A Support Zone (operations center) will be established adjacent to the selected gate and upwind (north or west) of the Exclusion Zone. Workers must exit the Exclusion Zone through the Decontamination Zone to enter the Support Zone, and to leave the Site.

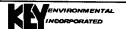
Currently, access to the Northeastern Area (Figure 2) is limited due to perimeter fencing, wet/muddy conditions, and tank saddles. In order to access the elevated window and door openings, articulating man or boom lift equipment may be required to reach Openings on the taller buildings. The safest and most productive manner to access the Northeastern Area is via northern fence gate along the Diamond property and such route will be used when field conditions warrant.

To the extent practical, closure work will be conducted from outside the buildings. Some windows and doors have wooden interior frames (e.g., Building 15) or other structures accessible for anchoring the framing or closure boards. It may be more efficient to secure these Openings from the interior of the building. The contractor will determine which method will be used as the situation warrants. Also, some buildings have intact doors and/or windows. In these instances and at the Contractor's discretion, intact doors may be closed by locking or boarding; secure, intact windows will be considered closed. Closing openings from the inside of a multi-story building may require erecting scaffolding.

The contractor should consider progressing in the following order:

- Close Openings on the upwind side of the building.
- Close Openings on the adjoining sides of the building.
- Close Openings on the downwind side of the building.
- Close Openings on the roof of the building, where necessary.

Daily safety meetings will be held with Site workers in accordance with the Project-specific HASP. The HASP addresses potential on-site health and safety issues in depth, and will be followed for the duration of the project.



5.3.3 Temporary Fence Removal

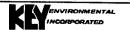
To allow equipment access to the Northeastern Area, it may also be necessary to temporarily remove sections of the fence. Caution fencing will be used to secure the area while the original fencing is removed. The fence will be returned to its original condition when access is no longer required.

5.3.4 Management of PPE and Decontamination Liquids

Personal Protective Equipment from various Interim Actions has been determined by the NJDEP to be non-hazardous ID27 Dry Industrial Waste and will be disposed with this profile. Decontamination fluids will be containerized, sampled for waste characterization parameters and disposed accordingly.

5.4 CONTRACTOR QUALIFICATIONS

Work will be performed by a Contractor or subcontractor experienced in performing the tasks outlined in this Work Plan. The Contractor will provide proof of insurance in the amounts required by the Project Coordinator. On-site workers must have OSHA 40-hour HAZWOPER and current 8-hour refresher training certification. Prior to mobilizing workers to the Site, an on-site meeting will be held with the contractor, and routinely during work, to determine efficient and accepted methods for successfully closing the Openings.



6.0 PROJECT SCHEDULE

As required by Section Paragraph 45(a) of the Order, a detailed project schedule is proposed herein. Figure 4 provides a summary of the proposed project schedule. Ultimately, all tasks are tied to both the approval date of this Work Plan and the effective date of the Order (Effective Date). Descriptions of the schedule considerations for primary tasks are provided below. Any changes to the schedule are subject to the concurrence of EPA. Following EPA approval of the schedule, EPA will be provided with a notice of any proposed changes at least 48-hours prior to the expected implementation of such change.

6.1 TASK DESCRIPTIONS

Administrative Tasks

Designation of Project Coordinator Within five (5) Working Days (as that term is defined in the Order) of the Order Effective Date, the name, address, qualifications, and telephone number of the Project Coordinator will be provided to EPA. The Project Coordinator will have the technical expertise sufficient to adequately oversee aspects of the tasks identified in the Order. The Project Coordinator is subject to written EPA approval. If EPA disapproves of a proposed Project Coordinator, the Respondents will designate a different Project Coordinator, and will provide EPA with the required information within seven (7) Days of EPA's request. In the event it becomes necessary to change Project Coordinators, the Respondents will provide written notice to EPA at least seven (7) Days prior to the desired change unless a shorter period is agreed upon by EPA in writing.

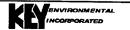
Designation of the Project Coordinator was completed and submitted to EPA on June 12, 2010.

Contractor Selection – Within ten (10) Working Days of the Order Effective Date, the name and qualifications of a proposed contractor will be provided to EPA. If additional contractors or subcontractors are proposed to perform work under the Order, the names and qualifications of such contractors or subcontractors will be provided to EPA at least ten (10) Working Days prior to commencement of such work unless EPA agrees to a shorter period in writing.

Work Tasks

Begin Implementation of the approved Work Plan – Within five (5) Working Days after receipt of EPA's written approval of this Work Plan, Respondents will initiate implementation of this Work Plan.

Preliminary Tasks - An on-site meeting between the Project Coordinator, Contractor, and/or a Health and Safety or Project Manager will be scheduled. The purpose of this meeting is to determine a safe and effective method of closing building Openings, define equipment needs, schedule mobilization to the Site, discuss HASP requirements, discuss the daily safety meeting

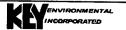


requirements, verify the Decontamination Areas and the Exclusion Areas, determine Warning Sign requirements, and set a daily work schedule.

Site Preparation Tasks – Much of the area surrounding the work area is overgrown with weeds and brush. Prior to initiating the closing of building openings, clearing of the overgrown areas are necessary to provide safe access to the work area for personnel and equipment. The cleared vegetation will be located within the work area.

Close Building Openings Task – Building Openings will be closed in the safe and effective manner as identified herein and as agreed by the Project Coordinator, Contractor, and Health and Safety Manager.

Cleanup Tasks – Following successful closing of building Openings, equipment will be decontaminated via pressurized hot water methods with a decontamination pad. The decontamination fluids will be collected in drum(s) and characterized accordingly. Arrangements will be made with an approved TSD facility for waste disposal based upon the characterization results.



7.0 REPORTING

Reporting requirements are summarized below.

Written Progress reports

Progress reports describing all actions and activities undertaken pursuant to the Order will be provided to EPA every fourteen (14) calendar days beginning on the date of EPA's approval of the Work Plan and continuing until the date that the Final Report is submitted.

Progress reports will include:

- A description of actions taken toward achieving compliance with the Order during the previous fourteen (14) calendar days.
- A description of actions scheduled for the next fourteen (14) calendar days.
- Additional information relating to the progress of work as is customary in the industry.
- Information regarding percentage of completion, delays encountered or anticipated that may affect the future schedule for completion of the work.
- A description of efforts made to mitigate those delays or anticipated delays.

Final Report

Within thirty (30) Days of the completion of closing building Openings in accordance with this Work Plan, a Final Report will be submitted to EPA. Building 19 and 20 demolition will be addressed separately under the IRA implementation activities and schedule. The Final Report will be certified as provided in Paragraph 47(c) of the Order and will contain:

- A summary of work performed under the Order; and,
- A detailed description of EPA-approved modifications to the Scope of Work.

Document Submittal

Documents required to be submitted to EPA under the Order will be emailed or sent to:

Original, hard copy and electronic copy to:

Kimberly Staiger, OSC U.S. EPA Region II – Removal Action Branch 2890 Woodbridge Avenue, Bldg. 209, MS-211 Edison, NJ 08837-3679 Staiger.Kimberly@epa.gov



Edward Als, RPM U.S. EPA Region II – Eastern NY Remediation Section Emergency and Remedial Response Division 290 Broadway, 20th Floor New York City, NY 10007-1866 Als.Ed@EPA.gov

One electronic copy to:

Sarah Flanagan, Esq. Flanagan.sarah@epa.gov

One hard copy to:

Chris Kanakis, Case Manager New Jersey Department of Environmental Protection Office of Brownfield Reuse 401 E. State Street PO Box 028 Trenton, NJ 08625 **FIGURES**







REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES OF JERSEY CITY, AND WEEHAWKEN, NEW JERSEY

ISSUE DATE: 06/23/09

KEY ENVIRONMENTAL, INC 200 THIRD AVENUE CARNEGIE, PA 15108

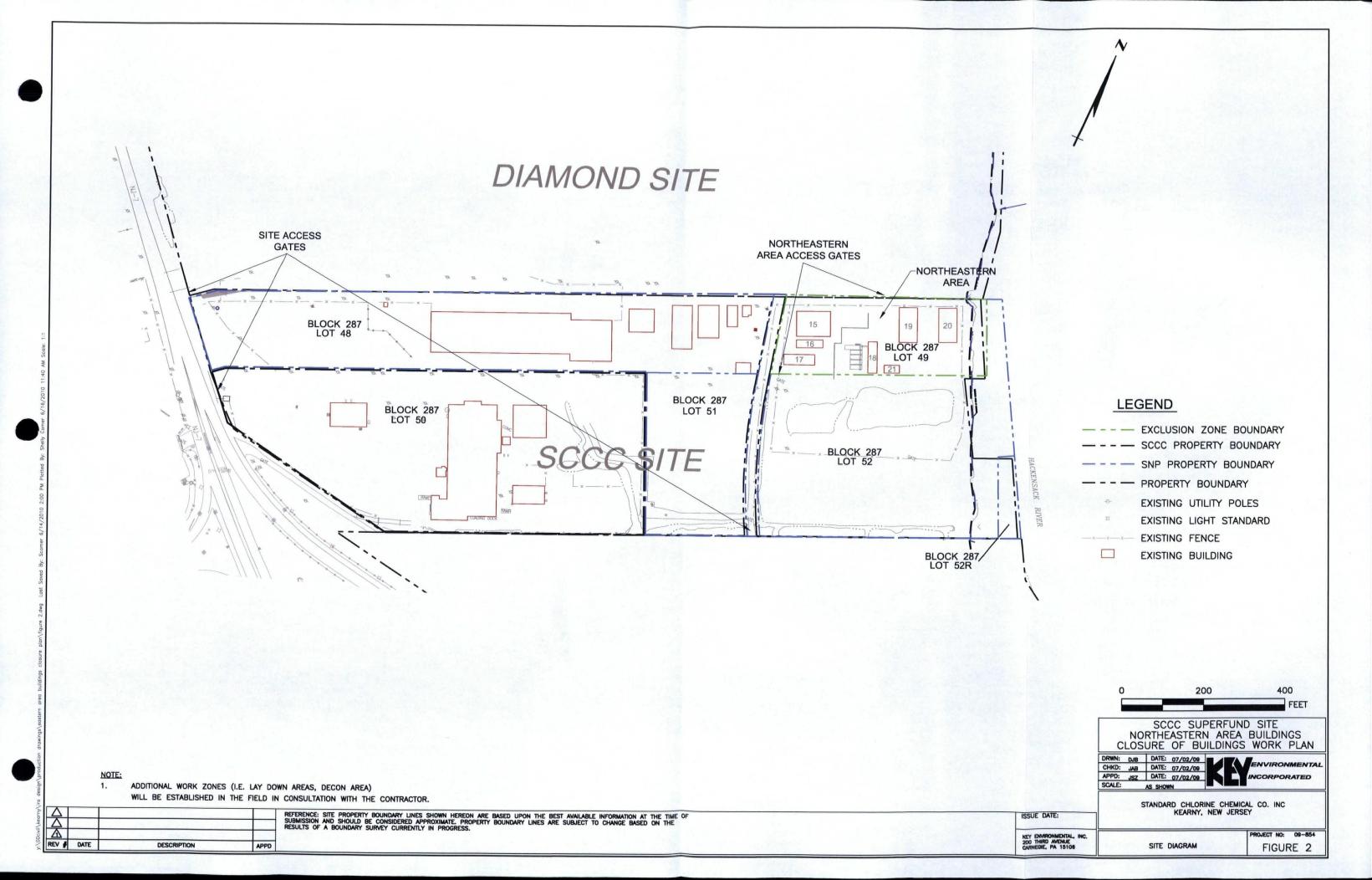
SCCC SUPERFUND SITE NORTHEASTERN AREA BUILDINGS CLOSURE OF BUILDINGS WORK PLAN

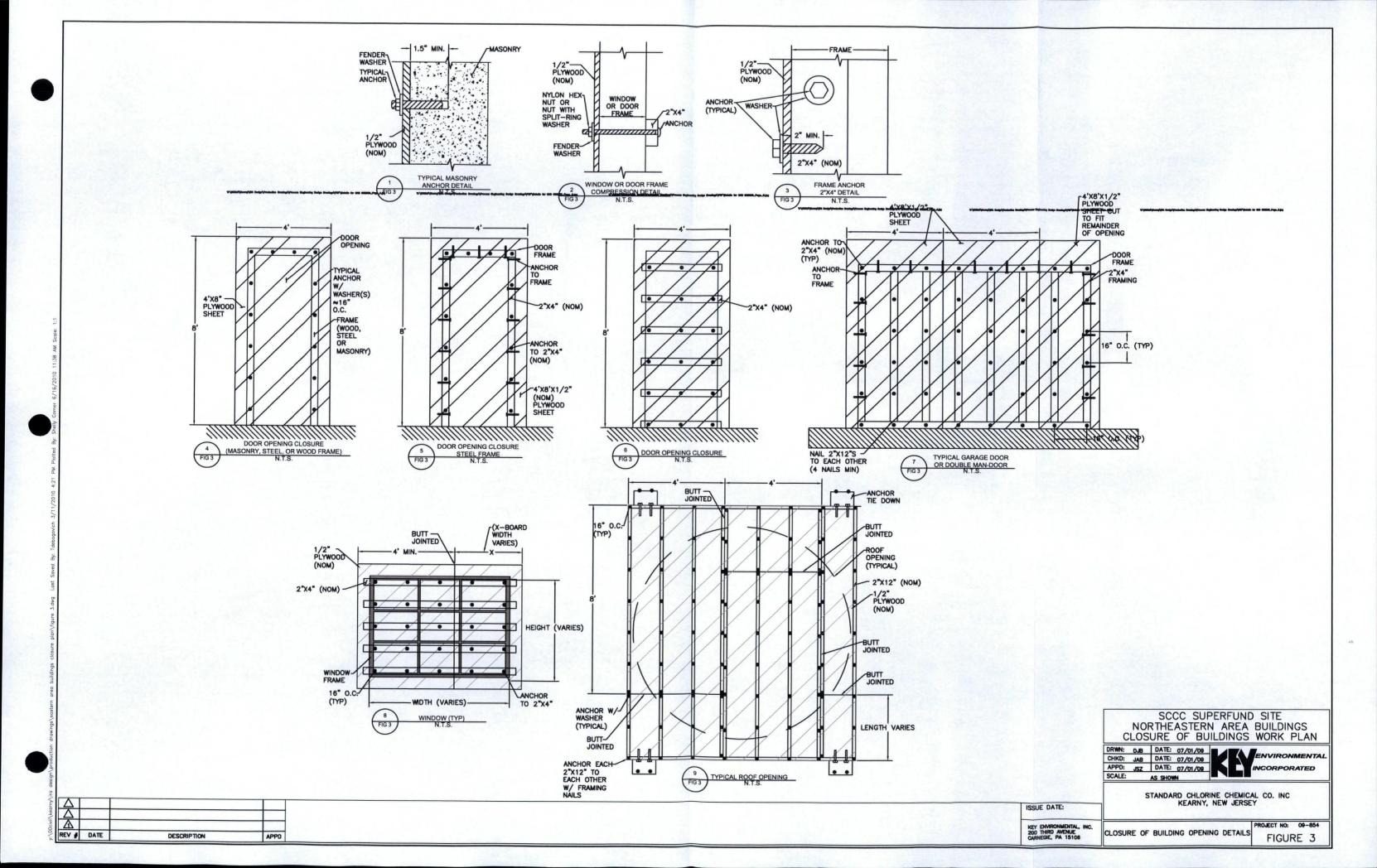
DRWN: DJB DATE: 06/23/09 CHKD: JAB DATE: 06/23/09 APPD: JSW DATE: 06/23/09 SCALE:

STANDARD CHLORINE CO. INC. KEARNY, NEW JERSEY

SITE LOCATION MAP

PROJECT NO: 0 FIGURE 1





TABLES



TABLE 1 BUILDING DETAILS**

Building No.**	Description	Approximate Dimensions (ftxft)	Windows (Approx. No.)	Doors (Approx. No.)	Roof Openings (Approx. No.)
15	Four to five story, transite-sided	80x60	22	5 Man 1 Double 2 Garage	0
17	Two to three story masonry (brick and concrete)	75x25	13	6 Man 1 Double 1 Garage	1
18	Approximately eight-stories, transite sided	76x20	48	5 Man 3 Double	0
21	2-story transite- sided	36x18	4	3 Man 1 Double	2

^{**} Buildings 16, 19 and 20 are planned for demolition as part of the IRA Implementation. SCCC is moving forward with the pre-requisite demolition activities. See Section 4.0 for additional information.



APPENDIX A BUILDING PHOTOGRAPHS





Photograph 1: Bldg. 15, east side



Photograph 2: Bldg. 15, south side





Photograph 3: Bldg. 15, south side



Photograph 4: Bldg. 15, east and north side





Photograph 5: Bldg. 15, east side

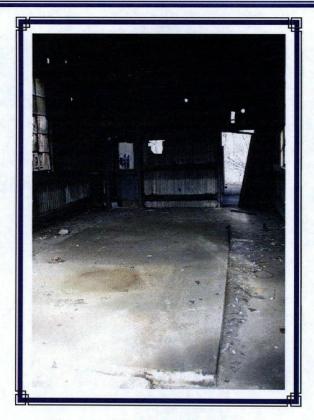


Photograph 6: Bldg. 15, west and south side

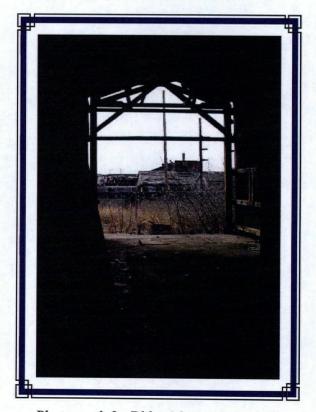




Photograph 7: Bldg. 15, east side



Photograph 1: Bldg. 16, interior wall



Photograph 2: Bldg. 16, open west end





Photograph 3: Bldg 16: West opening



Photograph 4: Bldg 16: West end of building looking inside.

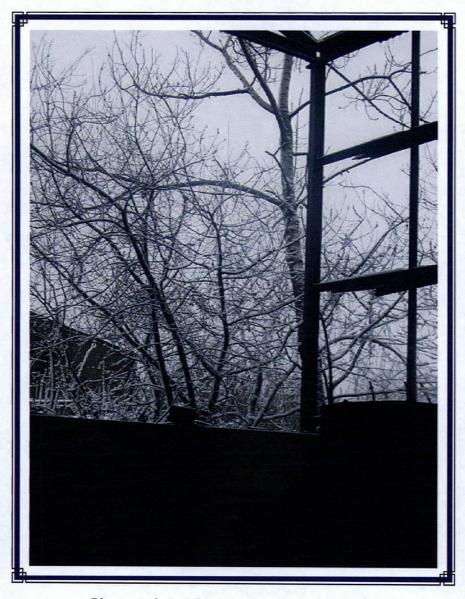


Photograph 5: Bldg 16: Roof opening east side





Photograph 6: Bldg 16: Roof and siding opening



Photograph 7: Bldg 16: showing missing siding



Photograph 1: Bldg. 17, south and east sides



Photograph 2: Bldg. 17, east side & Bldg. 15 south side



Photograph 3: Bldg. 17, east side



Photograph 4: Bldg. 17, south side





Photograph 5: Bldg. 17, north side



Photograph 1: Bldg. 18, north side, Bldg. 21 on left



Photograph 2: Bldg. 18, east side

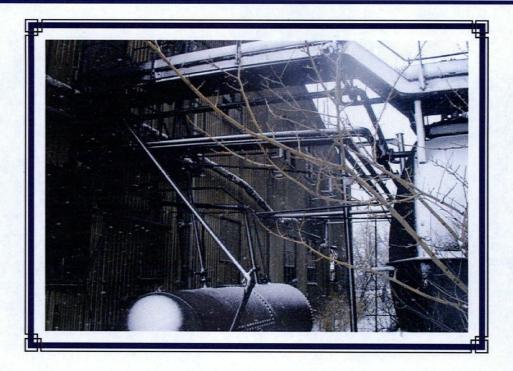


Photograph 3: Bldg. 18, east side



Photograph 4: Bldg. 18, west side





Photograph 5: Bldg. 18, west side



Photograph 1: Bldg. 19, interior



Photograph 2: Bldg. 19, north side





Photograph 3: Bldg. 19 & 20, south side



Photograph 4: Bldg. 20 & 19, east side



Photograph 5: Bldg. 19, east side



Photograph 6: Bldg. 19, west side





Photograph 1: Bldg. 20, interior



Photograph 2: Bldg. 20, south side





Photograph 3: Bldg. 20, west side



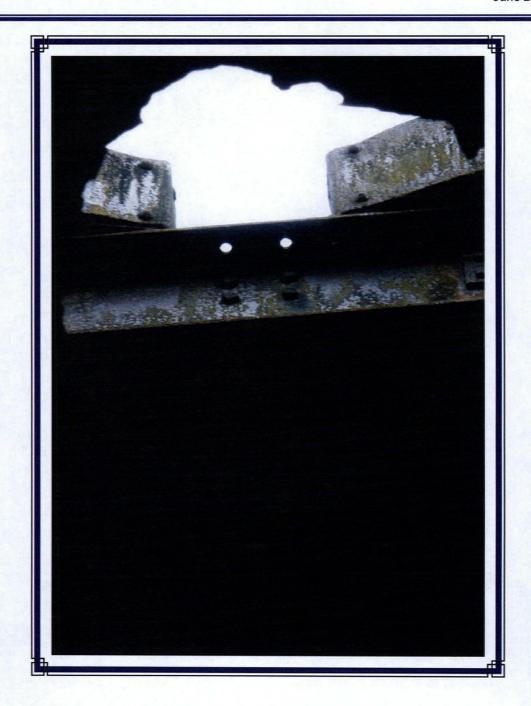
Photograph 4: Bldg. 20, north side



Photograph 1: Bldg. 21, north side



Photograph 2: Bldg. 21, east side



Photograph 3: Bldg. 21, steel channels in roof opening



Photograph 1: Bldg. 19 west side, Bldg. 21 north side, Bldg. 18 north & east sides.



Photograph 2: Bldg's, 21, 18, 15 & 20, east side





Photograph 3: Bldg's. 15 & 17, west side

APPENDIX B SITE SPECIFIC HEALTH AND SAFETY PLAN



REMOVAL ACTION HEALTH AND SAFETY PLAN

STANDARD CHLORINE CHEMICAL SITE KEARNY, NEW JERSEY

Prepared for:

The Peninsula Restoration Group (Standard Chlorine Chemical Company, Tierra Solutions, Inc. and Beazer East, Inc.)

Prepared by:

Key Environmental, Inc. 200 Third Avenue Carnegie, Pennsylvania 15106

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- C Emergency Contacts and Hospital Route Map



REVISIONS/ADDENDA TO HEALTH AND SAFETY PLAN

Revision	Date	Issued By	Revisions Made							
		·								
			1							

1.0 INTRODUCTION

This Health and Safety Plan (HASP) describes the program to be implemented by Key Environmental, Inc. (KEY) for Removal Actions at the Standard Chlorine Chemical Company (SCCC) Site located in Kearny, New Jersey. The Site location is shown on **Figure 1-1**. All work must be performed in accordance with applicable federal, state, and local regulations, including, but not limited to:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) 29
 Code of Federal Regulations (CFR) 1910.120, "Hazardous Waste Operations and Emergency Response"; and,
- OSHA 29 CFR 1926, "Safety and Health Regulations for Construction."

The health and safety practices, procedures, and personal protective equipment (PPE) requirements established within this HASP are based on hazards known to be present at this Site. All protective measures employed must be commensurate with known hazards associated with specific work activities and job tasks and must be modified if other hazards are identified during the course of the work.

This HASP should not be used for activities other than those outlined in the scope of work unless a task-specific hazard and exposure assessment is performed and any additional protective measures incorporated into the HASP.



2.0 PROGRAM ORGANIZATION AND RESPONSIBILITIES

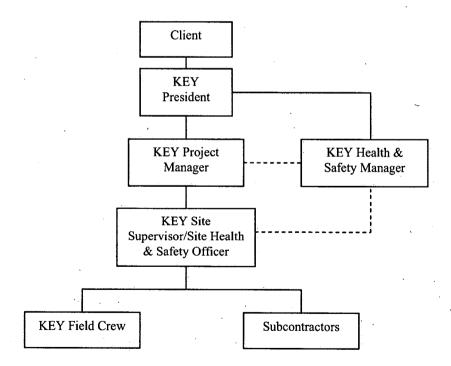
The design and implementation of the HASP are accomplished through an integral team effort comprised of the following:

- Project Manager The Project Manager is responsible for ensuring that all activities are conducted in accordance with the HASP. The Project Manager Reports to the President of KEY and has the authority to suspend field operations if employees are in danger of injury or overexposure to harmful agents. The Project Manager's responsibilities include:
 - Coordinating the development of a Site-specific HASP for all phases of the project;
 - Ensuring that the appropriate health and safety equipment and PPE are available for project personnel;
 - Ensuring that all personnel have received the appropriate training before they engage in activities that are potentially hazardous;
 - Ensuring that all required personnel have received the required medical examination, testing, and screening before engaging in work activities; and,
 - Designating a Site Health and Safety Officer (SHSO) and other Site personnel who will assure compliance with the HASP.
- <u>Project Site Supervisor/SHSO</u> The Site Supervisor also acts as the SHSO and is responsible for ensuring that all Site activities are conducted in accordance with the HASP. The Site Supervisor reports to the Project Manager. The Site Supervisor's responsibilities include:
 - Ensuring that personnel, subcontractor personnel, and visitors comply with the requirements of this HASP;
 - Notifying the Project Manager of any changes in work conditions or tasks which may require changes to the HASP;
 - Suspending field activities if necessary, and resume activities when appropriate;
 - Coordinating safety meetings and daily safety briefings, as necessary;
 - Managing health and safety equipment, including instruments, respirators, gloves, suits, and other PPE, used in field activities;
 - Acting as the Emergency Coordinator at the Site and arrange for emergency response in cooperation with local emergency and health officials;
 - Monitoring conditions during field activities to assure compliance with HASP;
 - Monitoring conditions during field activities to determine if more stringent procedures or a higher level of PPE should be implemented;



- Maintaining a log to record conditions, personnel involved in field activities, and other pertinent health and safety data;
- Overseeing the arrangement and execution of personnel and equipment decontamination;
- Controlling visitor, subcontractor, and employee access to hazardous areas;
 and.
- Delegating, if necessary and appropriate, some of these responsibilities to other on-Site qualified employees.
- <u>Employees and Subcontractors</u> KEY Site employees and subcontractors report to the Site Supervisor and will be responsible for the following:
 - Becoming familiar with, and complying with, the HASP;
 - Attending training sessions to review the HASP and other safety and health information;
 - Being alert to identified and non-identified hazards;
 - Reporting unidentified hazards to the SHSO; and,
 - Conducting themselves in a manner that is orderly and appropriate for the Site.

PROJECT ORGANIZATION STRUCTURE CHART





3.0 SITE CHARACTERIZATION AND HAZARD ASSESSMENT

3.1 SITE BACKGROUND AND DESCRIPTION

The SCCC Site consists of approximately 25-acres bounded by the Hackensack River to the east, Belleville Turnpike to the west, the former Diamond Shamrock Site to the north and northwest, and by the former Koppers Company, Inc. Seaboard Site to the south. **Figure 1-1** is a topographic map showing the Site location. **Figure 2** is a Site plan which also shows the locations of buildings included in the Removal Action. The Site is relatively flat and is fenced along most of the perimeter. Manufacturing operations were conducted at the Site by various entities between 1916 and 1993, and included the refining of naphthalene, the manufacture of products from naphthalene, naphthalene derivatives and dichlorobenzenes, the formulation of drain cleaning products, and, on a limited basis during the 1970s, the processing of trichlorobenzene. The naphthalene refining operations were conducted in the eastern two-thirds of the Site. The manufacture of dichlorobenzene products and the formulation of drain cleaning products occurred in the western one-third of the property. Trichlorobenzene processing occurred in the northeastern section of the Site.

U.S.EPA is requiring the closing and sealing of windows, doorways and other Openings in seven buildings on the SCCC property in order to prevent the migration of materials outside the buildings. These buildings are located in the northern and eastern portion of the Site as shown on **Figure 2**.

3.2 SCOPE OF WORK

This HASP covers actions to:

- Close and seal the openings of all buildings located on the eastern portion of the Site within the inner fenced area.
- Post warning signs along the fencing and other locations where appropriate.
- Conduct Site inspections to ensure that constructed barriers are intact and implement any additional access controls that may be warranted.

Contractors who perform activities outside the scope of this HASP must develop their own sitespecific HASP to address the work they will perform at the Site.



Work is expected to be performed in summer or fall 2009 and take approximately two months to complete.

3.3 CHEMICAL HEALTH HAZARDS

Potential health hazards at the SCCC Site and in the buildings include the potential exposure to volatile and semivolatile organic compounds (VOCs and SVOCs), particularly chlorobenzenes and naphthalene. Dioxin was found at the Site in low concentrations in the Lagoon and in surface soils near the former dichlorobenzene tank area. Low levels of dioxin may present on or in building materials at the former distillation area.

A summary of health hazard data is given in the following sections. **Table 1** presents exposure limits and other properties of chemicals that may be present at this Site.

The main route of exposure for Site chemicals is skin/eye contact and absorption; a second route of exposure is inhalation of vapors/dust. Incidental ingestion is also a possible route of exposure. Potential exposures will be reduced or eliminated by following the work practices and using the PPE designated in this HASP. The overall chemical health hazard assessment for activities covered by this HASP at the Site is low to moderate.

3.3.1 **VOCs**

The VOCs may irritate skin on contact and irritate the respiratory tract on inhalation. Eye contact may cause eye irritation, burning and inflammation. Ingestion may result in nausea, vomiting, abdominal pain, rapid pulse, respiratory distress and shock. Absorption into the body systems by any route may cause trouble breathing, dizziness, headache, nausea, vomiting, salivation, and convulsions. Overexposure by inhalation may cause drunkenness, drowsiness, incoordination, tremors and restlessness, and an increase in heart rate and pressure. Chronic or long-term effects of overexposure to site constituents may cause dermatitis, and cancer of the liver, kidneys, and respiratory tract.



3.3.2 SVOCs

SVOCs found in buildings, particularly the distillation building, include chlorobenzene, dichlorobenzenes, trichlorobenzene and naphthalene. Primary entry routes into the body for SVOCs are inhalation, ingestion, and skin contact. These materials pose less of an inhalation hazard than VOCs because they are less likely to volatilize. However, SVOCs can be a potential constituent of airborne dust and pose an inhalation hazard. Inhalation of SVOCs may irritate the respiratory tract. Eye contact may cause eye irritation, burning and inflammation. Immediate or acute effects from short-term skin exposure to SVOCs include irritation; burning, itching, redness, skin color changes, and rashes.

3.3.3 Dioxin

Dioxin is a common name for 2,3,7,8-tetrachlorodibenzo-p-dioxin, or TCDD. In addition to dioxin itself there are other compounds that have similar structures and activity as dioxin. These are commonly referred to as dioxin-like compounds or dioxins. Dioxin concentrations at the SCCC Site are expected to be low. However, certain precautions must be taken during work activities especially at the former dichlorobenzene and distillation buildings. See Sections 5.0 and 6.0 for details.

Acute health effects of overexposure to dioxin include irritation of the skin and eyes, headache, weakness, dizziness, nausea and vomiting. Exposure to high concentrations of dioxin or exposure over a long period of time can cause a skin condition called chloracne, reproductive effects, cancer, liver damage, and nervous system damage.

No occupational exposure limits have been established for dioxin. The National Institute for Safety and Health recommends that exposure be limited to the lowest feasible concentration.

3.3.4 Chromium from Chromite Ore Processing Residue (COPR)

Chromite ore processing residue (COPR) was used as fill material at the SCCC Site but surface cover of pavement or stone will mitigate potential chromium exposure in the western area of the



Site. Total chromium concentrations in soil and sediments at the SCCC Site range up to 32,600 mg/kg in the eastern part of the Site. Hexavalent chromium concentrations are low in most areas of the Site (below 40 mg/kg).

Chromium may be present at the ground surface of the unpaved portions of the Diamond Site and eastern portion of the SCCC Site as total chromium, chromium III, or chromium VI. Chromium and chromium III have relatively low levels of toxicity. Chromium VI, or hexavalent chromium, compounds, particularly chromium oxide, can cause skin, eye and respiratory tract irritation; sometimes severe. Acute overexposure can cause nervous system and liver and kidney damage. Because the highest chromium concentration areas of the SCCC and Diamond Sites are paved or covered with stone there should be little hazard from dust exposure. However, care should be taken to keep dust at a minimum when driving on, or other disturbance of unpaved portions of the Site.

3.3.5 Asbestos

Asbestos may be found at the Site in the form of Transite panels used for interior and exterior building walls as well as insulation on piping or tanks inside buildings. Transite is a mixture of asbestos and cement that was used to make many building products. Asbestos fibers may be released when cutting, drilling, sawing, breaking or handling Transite panels and if asbestos insulation is disturbed. Nose, throat and skin irritation are possible upon exposure to high airborne concentrations of asbestos. Long term, high levels of airborne exposure may cause asbestosis (fibrosis or scarring of the lung), lung cancer, mesothelioma (cancer of the lining of the lung and /or abdomen), and pleural plaques (thickening of the lung's lining) which develop many years after exposure. However, because of the short duration of this project the potential for overexposure is low.



Material Safety Data Sheets (MSDSs) for select potential Site constituents are found in **Appendix A**. Exposure to Site constituents can be avoided or limited by the proper use of personal protective equipment. For these reasons, potential exposure risks to Site constituents are considered to be low.

3.3.6 Other Hazardous Substances Used at the Site/Hazard Communication

A list of hazardous chemicals and MSDSs for hazardous chemicals used at the Site by KEY or contractors must be kept at the Site. All containers of hazardous substances must be labeled with the name of the chemical and appropriate hazard warnings. Employees and contractors who use hazardous substances must read the labels and know where MSDSs are located in case of an emergency.

3.3.7 Work Task Hazard Assessment

Table 1 presents exposure limits and other properties of chemicals that may be present at this Site. More information concerning the health effects of Site chemicals can be found in the Material Safety Data Sheets (MSDS) in Appendix A. The overall chemical health hazard assessment for activities at this Site is low. Table 2 summarizes the chemical hazards associated with Site work tasks, a relative hazard assessment, proposed initial levels of personal protection, and air monitoring requirements.

3.4 PHYSICAL HAZARDS

Physical hazards on the Site are those associated with driving and walking around the Site to access buildings, uneven terrain, movement and use of construction equipment; working at heights, heat stress/cold stress and snow in winter. Safe work practices for these potential hazards are outlined in Section 3.6 (heat stress), Section 3.7, (cold stress) and Section 5.0.

3.5 CONFINED SPACES

The buildings are not considered confined spaces and no confined space entry is necessary for



the completion of this project. Entry into confined spaces is only allowed upon the approval of the KEY Health & Safety Manager. The KEY Health & Safety Manager will determine if entry is necessary and will detail specific entry procedures. KEY and OSHA CSE procedures must be followed, including atmospheric testing of the space and completion of a CSE permit before entry. A minimum of two trained employees must be present for any entry.

3.6 HEAT STRESS

Heat stress may be a concern during warm weather. Heat cramps are the least severe form of heat stress, cramps occur due to the depletion of body salts from sweating. Heat exhaustion results from significant loss of body salts and fluid. Its symptoms may include weakness or fatigue, nausea, headaches, and in more serious cases, clammy, moist skin with pale or flushed complexion. Heat stroke is the most serious heat-related condition and occurs when the body's system to regulate internal temperature fails. Symptoms are hot, dry skin; mental confusion or delirium; convulsions or unconsciousness; and body temperature of 105 degrees Fahrenheit (°F) or higher. In this situation, medical attention is needed immediately; heat stroke may be fatal. To prevent heat disorders, attention must be paid to such variables as temperature, humidity, air movement, and the physical condition of employees. In addition, breaks must be taken as needed to let the body cool. Liquids designed to replace lost body salts must be provided regularly.

3.6.1 Heat Stress Prevention

Heat stress can occur even when temperatures are considered moderate. The following recommendations should be followed to help reduce heat stress:

- Personnel must drink plenty of liquids to replace body fluids lost to sweating. To
 prevent dehydration, personnel should be encouraged to drink generous amounts of
 water even if not thirsty. Heat-related problems can happen before the sensation of
 thirst occurs.
- Cool drinking water, 50°F to 60°F, should be made available to all personnel.
- Only water, or occasionally, electrolyte-balanced drinks, such as Gatorade[®], should be used to replace lost fluids due to sweating.
- Beverages containing caffeine, such as colas, coffee, or tea, should be limited or not used because of their diuretic (water depleting) effects.



- Salt tablets should not be used unless prescribed by a physician.
- Self-monitoring of physical condition and buddy monitoring will be essential in order to prevent any heat stress illness. All personnel should be aware of heat stress symptoms and the proper precautions to take if heat stress is observed.
- Rest periods must be provided for all personnel. This means at least 15 minutes in the morning and in the afternoon and at least 30 minutes for lunch. A more frequent rest schedule may be implemented by the SHSO depending on weather conditions and the type of work performed.

3.7 COLD STRESS

Cold weather conditions may result in cold stress ranging from mild frostbite to severe hypothermia. Cold injury and impaired ability to work are dangers at low temperatures and when the wind chill factor is low. Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, at temperatures of 40 °F. Extreme cold for a short period of time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area to volume ratio, such as fingers, toes and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and wind speed. For instance, 10 °F with a wind of 15 miles per hour is equivalent in chilling effect to still air at -7 °F. A wind chill chart is presented on the following page.

It does not have to be extremely cold for systemic hypothermia to occur. *Hypothermia* may occur at outdoor temperatures approaching 50 °F. Systemic hypothermia occurs when the body core temperature decreases. Symptoms begin with shivering, apathy, loss of coordination, followed by lethargy and coma; if allowed to continue, hypothermia may result in death. Get the victim out of the cold and into dry clothing. Warm up his or her body slowly. Give nothing to eat or drink until the victim is fully conscious. Warm fluids, but no stimulants such as tea, coffee, alcohol or tobacco should be given. Get medical attention immediately.

Frostnip, or incipient frostbite, usually involves the ears, nose, chin, cheeks, and fingertips and toe tips. It occurs during high wind, low temperature, or both. The skin suddenly blanches (becomes white). Frostnip is painless and can be reversed without tissue damage by warming the affected area by using warm water. The area should not be rubbed.



Superficial frostbite is a more severe local cold injury. This involves the skin and superficial tissue just beneath it. The skin becomes white, waxy, and firm; the tissue beneath it remains soft. Affected personnel should be taken out of the cold and the affected area slowly and carefully rewarmed. Again, the area should not be rubbed. Stinging and burning may follow warming and superficial blisters may occur.

Deep frostbite involves freezing not only of skin and subcutaneous tissue but even muscle and bone. The emergency treatment for deep frostbite is immediate warming. Affected persons should be kept dry, provided with external warming, and the frostbitten part covered by a dressing while being transported promptly to the nearest emergency department. Warm fluids, but no stimulants such as tea, coffee, alcohol or tobacco should be given to frostbite or hypothermia victims.

3.7.1 Cold Stress Prevention

To prevent or minimize the effects of cold stress, the following work practices should be followed:

- Use dry, insulated and/or layered work clothing, warm gloves, hard hat liners, and boots. Combine winter gear with chemical resistant personal protective equipment and waterproof gear to provide the best protection for the given site task and weather conditions.
- Provide rest breaks in warm areas as necessary.
- Use the following wind chill chart to estimate the effects of wind and temperature on the body. Be especially careful to note when frostbite is a potential hazard.



WIND CHILL CHART																		
Wind Speed		Temperature (°F)																
Calm	40	35	30	25		15	10	5	Ó	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4 ·	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98
Frostbite Times			30 n	nin.	10 n	nin.	5 m	n.										

Wind Chill (°F) = $35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

Where T = Air Temperature (°F), V = Wind Speed (mph)

From National Oceanographic and Aeronautics Administration and the National Weather Service, 2002

3.8 BIOLOGICAL HAZARDS

Biological hazards present at the Site may include poisonous plants, insects, and animals. <u>Poison ivy and poison oak</u> may be present. Contact with the leaves, vine, roots, or sap causes a skin rash on many people. All workers must be familiar with the appearance of poison ivy (three leaves) and wear impervious protective clothing as necessary to prevent contact with poison ivy.

<u>Ticks</u> may be present throughout the Site on brush, grass, and weeds. Some ticks carry disease, such as Lyme disease or Rocky Mountain spotted fever. Wear protective clothing or secure pant legs to lower leg or boot and apply bug repellent to this area. Frequently assist each other in inspecting for ticks. If a tick is found attached to the skin, do not attempt to pick the tick off the skin with fingernails or scrape with a credit card, etc. Carefully remove the tick with tweezers taking care that all parts are removed. Thoroughly scrub the area with soap and water. Save the tick in a small jar or plastic bag and take it to a doctor or health department for identification. If a red circle or rash forms in the area of the tick bite or if flu-like symptoms appear in a few days or weeks consult a doctor for treatment.



A particular hazard at this Site during warmer weather is <u>mosquitoes</u>. Besides the annoyance of the buzzing insects and ordinary mosquito bites, some mosquitoes can transmit West Nile Virus and other diseases. West Nile Virus can be a serious disease, especially for people over 50 years old. Most people have no symptoms after infection but some people have mild symptoms that can include fever, headache, body aches, nausea, vomiting, and swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms last a few days to several weeks. A few people develop severe illness. Symptoms may include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. Symptoms may last several weeks and neurological effects may be permanent. People older than 50 are at a higher risk to get sick, a very few people may die from a West Nile virus infection.

The best way to prevent West Nile Virus is to avoid being bitten by mosquitoes. When working outdoors wears light-colored long sleeve shirts, long pants and socks sprayed with insect repellent. Use repellent carefully! Follow the manufacturer's directions for the repellent you are using. Repellents with DEET (N, N-diethyl-meta-toluamide) or permethrin are effective against mosquitoes and other biting insects. You can use DEET directly on your skin and clothing but do not use on skin under clothing. Use permethrin only on clothing, not directly on skin, and let sprayed clothing dry before use. Repellents with a higher concentration do not mean they work better but that they work longer.

According to the Centers for Disease Control (CDC), a recent study indicated the following:

- A product containing 23.8% DEET provided an average of 5 hours of protection from mosquito bites.
- A product containing 20% DEET provided almost 4 hours of protection.
- A product containing 6.65% DEET provided almost 2 hours of protection.
- Products containing 4.75% DEET and 2% soybean oil were both able to provide roughly 90 minutes or protection.

Sweating or getting wet may mean you need to re-apply repellent more frequently. If possible wash exposed skin before re-applying repellent. Be sure to wash skin that was sprayed with repellent at the end of the day. Wash hands before eating or using the restroom.



<u>Wasps, bees</u> and other stinging insects may also be found at the Site. Use of DEET of repellent containing permethrin will help keep wasps and bees away. However, if a nest is disturbed the repellent will not help. Be alert for bees flying into and out of a particular area, hanging nests, and nests in logs, pipes and other structures. Wear light-colored clothes as darker clothes tend to annoy some stinging insects.

First aid for insect bites and stings includes: applying a baking soda paste of ice wrapped in a wet cloth. Commercial bee sting kits may be helpful. Honeybees leave their stingers in the body; these can be removed by gently scraping the skin, working side to side of the stinger. A bee sting or snake suction device can also be used. If an insect bite becomes red or inflamed or the person becomes dizzy, nauseous, or short of breath then get to medical care immediately.

Avoid unnecessary contact with animals. Some animals may carry disease or poison or may cause injury by biting. If an animal is acting strangely, or if a wild animal approaches humans, leave the area. If necessary, call animal control personnel. Do not try to feed wild animals.

Snakes may also be present on the Site. Leave snakes alone, do not attempt to catch or kill. Stay out of tall grass, brush, and wood or rock piles. Keep hands and feet out of areas you cannot see. If bitten, get the person to medical help immediately. If practical, try to quickly identify the type of snake or at least the color and markings and size. First aid for snake bites includes: Wash the bite with soap and water or antiseptic cleanser, immobilize the bitten area and keep it lower than the heart, cover the area with a clean, cool compress or a moist dressing to minimize pain and swelling. Keep the victim calm and comfortable. If the victim cannot reach medical care within 30 minutes apply a bandage, wrapped 2 to 4 inches above the bite, to help slow the venom. This should not cut off the flow of blood from a vein or artery – the band should be loose enough to slip a finger under it. Without cutting, place a suction device over the bite to help draw venom out of the wound. Continue alternating suction and application of a compress while transporting to a doctor or hospital. Do not give the victim food or alcohol and only limited other liquids as necessary.



4.0 MEDICAL SURVEILLANCE

All medical examinations and procedures are performed by or under the supervision of a licensed physician at no cost to employees, without loss of pay, and at a reasonable time and place.

4.1 PRE-ASSIGNMENT SCREENING

Employees who perform the work tasks outlined in this HASP must have a current medical screening and approval for work at hazardous waste sites in accordance with 29 CFR 1910.120(f) and the company medical screening policies and procedures. This screening includes:

- Comprehensive medical/occupational history and physical examination;
- Visual acuity and color vision;
- Audiometry (OSHA) 500, 1000, 2000, 3000, 4000, and 6000 Hz, both ears;
- Complete blood count, including platelets;
- Complete serum profile (including serum chemistry, liver profile and serum lipids);
- Chest X-ray, posterior/anterior view, if not taken in the past three years (results must be available to examining physician), or if indicated by medical necessity;
- Spirometry (pulmonary function test);
- Urinalysis; and,
- Electrocardiogram (EKG), if medically necessary.

The physician will provide a written opinion regarding the potential employee's fitness for working at a hazardous waste site, ability to wear a respirator, and any limitations upon the employees assigned work. Employees are furnished a copy of the written opinion, and results of the medical examination and tests upon request.

The company will schedule medical examinations, select appropriate clinics or physicians, review physicians' reports, and maintain employee medical files. Employee medical files are confidential and will not be released without the express written approval of the employee. A copy of all physicians' reports, results and opinions and medical monitoring data will be made available to the employee upon request.



Repeat tests or additional tests or examinations recommended by the physician, based on the initial medical screening and related to the employee's ability to work in hazardous environments, will be arranged by the company.

4.2 PERIODIC MEDICAL EXAMINATIONS

Employees engaged in work with potential exposure to hazardous materials will undergo an annual update of medical and occupational history and an annual physical examination. More frequent medical examinations, consultations, and/or laboratory testing will be provided:

- For employees who, in an emergency situation, may have been exposed to hazardous substances at or near permissible exposure limits (PELs);
- As soon as possible, upon notification by an employee, that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards; and,
- If the examining physician determines that an increased frequency of examination is medically required.

The company will arrange for periodic medical examinations and maintain records in the employee's medical file.

4.3 MEDICAL RECORDS

All medical records, including pre-employment medical screening, periodic medical examinations, emergency and non-emergency treatment records, and accident reports, will be maintained in accordance with the following:

OSHA 29 CFR 1910.1020 - Medical records.

OSHA 29 CFR 1904 - Injuries, illnesses, and annual summaries.

4.4 TERMINATION EXAMINATION

Upon termination from employment, all employees whose work involved potential exposure to hazardous materials and who have not received a medical examination within the previous six months will be provided a termination examination. Records of the termination examination will



be maintained in accordance with 29 CFR 1910.1020. Employees will be notified regarding termination physical examination requirements.

4.5 SUBCONTRACTORS

Subcontractors who will perform work at this Site where there is a potential for contact with Site constituents are required to follow the medical surveillance requirements of 29 CFR 1910.120 and a medical surveillance program. Subcontractors who perform work where there is no potential for exposure to Site constituents, are not required to follow the medical surveillance requirements of 29 CFR 1910.120.

4.6 PHYSICIAN'S NAME AND ADDRESS

Key Environmental Pittsburgh office employees:

Walter W. Hoover, M.D., Medical Director Business Fit Pittsburgh's Ohio Valley General Hospital 25 Heckel Road McKees Rocks, PA 15136 (412) 777-6369

Key Environmental Whitehouse, NJ employees:

Eliot Kusnetz, M.D., Medical Director Total Care Occupational Medicine 370 Campus Drive Somerset, NJ 08873 (732) 748-1900



4.7 MEDICAL SURVEILLANCE CERTIFICATION

I certify that Key Environmental, Inc. employees engaging in on-site activities for more than 30 days or more per year are included in a medical surveillance program as stated above.

John E. Francis

John E. Francis, CIH, CSP Health & Safety Manager – Key Environmental, Inc.

5.0 WORK PRACTICES AND SITE CONTROL

5.1 ROUTINE SAFE WORK PRACTICES

Hygienic practices consistent with work hazards are necessary. Eating and food preparation will be prohibited in any area other than those designated and properly protected. Employees who handle potentially contaminated materials or articles will wash with soap or mild detergent and water before eating or using the rest room. No smoking s allowed in any work area except the support zone.

5.2 WORK RESTRICTIONS

All outdoor work at the Site must be conducted during daylight hours unless adequate lighting is provided. Outdoor work must cease immediately upon the signs of impending thunderstorms and lightning or other severe weather, as determined by the SHSO.

5.3 LIMITING EXPOSURE

Worker exposure must be limited as much as feasible. In order to reduce the potential for exposures work should be performed from outside the buildings when possible. Articulating manlifts will be used to access elevated openings when possible. At each building the work will progress in the following order:

- Close openings on the upwind side of the building;
- Close openings on the adjoining sides of the buildings;
- Close openings on the downwind sides of the building; and,
- Close openings on the roof of the buildings where needed.

Upon entering each building and/or room for inspection prior to performing work, the area must be inspected for slip, trip, & fall hazards and unprotected floor/wall openings. Adequate lighting must be provided before work can be performed.

In general, Tyvek suits and protective gloves will be worn by personnel inside the distillation building in order to avoid body and hand contact with potentially contaminated substrates.



5.4 FALL PROTECTION – ELEVATED WORK LOCATIONS

A man lift designed to meet OSHA fall protection requirements in terms of guardrails and other features will be staged on-site for elevated access. Any ladders and/or scaffolding mobilized on-site shall also be OSHA-approved and labeled with inspection date.

Only those workers who have received instructions regarding the inspection, application, and operation of an aerial lift, including recognition and avoidance of hazards, shall operate an aerial lift.

Aerial Lift Hazards include:

- A fall from an elevated level;
- Falling objects or items falling out of lifts;
- Exceeding the load capacity of the lift, which may result in tip-over or structural failure;
- Electrical hazards (e.g., overhead power lines, extension cords, bridge crane bus bars);
- Entanglement hazards (situations that may cause the lift to be caught on or snagged against other objects);
- Contact with stationary objects (e.g., walls, buildings, other vehicles, ceilings, floors, piping) that may result in an entrapment or crushing hazard;
- Uneven terrain that may cause the vehicle to tip, topple over or eject the operator;
- High winds or inclement weather such as rain, hail, snow, or lightning; and,
- Operation of an internal combustion engine vehicle indoors, which can cause asphyxiation or toxic exhaust-gas exposure. Unapproved use of equipment in unusual environments or the use of inadequate controls for operations or maintenance activities, which can cause a fire or explosion.

All operations must be performed safely and in accordance with accepted work practices.

Before Operation



Before operation, the operator must:

- Perform a pre-start inspection;
- Practice with the aerial lift (if unfamiliar with the lift) until comfortable/proficient with its operation;
- Read and understand the manufacturers' manuals;
- Understand all labels, warnings and instructions on the lift;
- Ensure that all occupants of the platform wear appropriate personal safety equipment for the conditions under which the platform will be operated (e.g., fall protection, hard hats); and,
- Have been instructed by a qualified person in the intended purpose and function of each of the controls.

Workplace Inspections

Operators will inspect the workplace to mitigate hazards before and during aerial lift use. Areas will be inspected for hazards such as:

- Drop-offs, holes, or untamped earthfills;
- Slope(s), ditches, bumps, and floor obstructions;
- Debris;
- Overhead obstructions and high voltage hazards;
- Other hazardous locations and atmospheres;
- Inadequate support (the working surface that the lift is sitting on cannot support the weight of the machine, men, etc. for the operation);
- Wind and weather conditions; and,
- Presence of unauthorized persons or other hazardous conditions.

Pre-Start Inspection

The aerial lift must be inspected for defects prior to each shift's operation. The pre-start inspection shall be performed and documented by the operator on each shift and will include items in accordance with manufacturer's recommendations for each specific aerial lift, such as:

- Operating and emergency controls;
- Safety devices;
- Personal protective devices;
- Hydraulic, air, pneumatic, fuel and electrical systems for wear, leakage, excessive dirt, moisture or any other condition which may impair the use of these systems;



- Fiberglass and other insulating components for visible damage or contamination;
- Missing or illegible placards, warnings, operational, instructional, and control markings;
- Visual inspection of all mechanical fastenings;
- Cables and wiring harnesses;
- Loose or missing parts;
- Wheels and tires;
- Operating manual(s), and their placement in weatherproof containers on the lift, or in the cab of the truck;
- Outriggers, stabilizers, and other structures;
- Guardrail systems; and,
- Other items specified by the manufacturer.

5.5 OPERATING HAZARDS

Operating hazards during construction activities may include work near construction and heavy equipment use, noise, electrical equipment and power lines, and excavations. The employees who are most at risk of being injured are individuals unfamiliar with the site and/or construction equipment. The initial site orientation by the Construction Contractor should include a review of the equipment to be used on-site, operating hazards and precautions, and the assignment of only trained and qualified personnel to operate equipment. KEY personnel are not permitted to operate heavy equipment.

Working Near Construction Equipment

- Never stand directly in front of a backhoe or front end loader; the operator cannot see you.
- Never stand or walk under a backhoe shovel or crane boom.
- Never walk or stand under loading or unloading equipment (i.e., when you are in an excavation). Also beware that equipment such as cranes and trucks with hydraulic lift beds can tip. Avoid standing next to them when in use.
- Wear light or brightly colored clothing. This may include safety vests.
- Maintain visual contact with machine operators. Coordinate with the operators a safe
 place to stand when you are not directly involved with site activities such as sampling
 or air monitoring.
- Prearrange a hand signal communication system with machine operators. The use of whistles, hand radios, and horns to communicate is also appropriate.



- If you are not familiar with the hand signals to guide heavy equipment operations or cranes do not attempt to direct their activities. Only trained signal persons may direct crane and other activities that use specialized hand signals.
- Two or more people should not simultaneously climb a ladder or access/egress ramp.
- Communicate with machine operators to ensure that your means of access/egress is not blocked by the equipment.

Noise

- Wear hearing protection as required by facility rules and in any marked area requiring hearing protection.
- Wear hearing protection while operating or working near heavy equipment, drill rigs, power tools, etc.
- A field rule is to use hearing protection if you cannot hear normal conversation within an arms length of the person talking.
- Wear hearing protection if sound levels exceed those shown on the following table:

Duration per day, hours	Sound level, dBA slow response
. 8	85
4	90
2	95
1 ,	100
1/2	105
1/4	110
Impact noise	140

Electrical Hazards

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment used on site may also pose a hazard to workers.

- Use low voltage equipment equipped with ground fault circuit interrupters and corrosion resistant connection cables while working on site.
- Inspect all electrical equipment periodically to ensure that the ground pathway is in working order.
- Monitor weather conditions and suspend work during electrical storms.
- Ground and discharge capacitors and other electrical equipment that may retain a charge before handling.

5.6 GENERATORS



Generators may be used to provide electricity for lighting or to power tools. Generators must be equipped with ground-fault circuit interrupters (GFCIs); any electric cords must be heavy duty and be rated for outdoor use; cords are not to be draped over sharp surfaces, placed in pinch points or placed where they are a trip hazard. Gasoline used to fuel generators is very flammable so care must be taken to store and use gasoline safely. Store gasoline only in approved safety cans; stop the generator and let it cool before refueling to avoid a flare up.

5.7 LIFTING

Follow safe lifting guidelines - lift with your legs, not with your back; if a load is too heavy, get help; do not try to lift and twist or turn at the same time.

5.8 HAND AND POWER TOOL SAFETY

The following are general guidelines to prevent accidents while using hand and power tools when working on treatment system equipment:

- Inspect each tool for damage before use;
- Use the right tool for the job;
- Operate tools according to manufacturer's instructions;
- Keep tools in good working condition with proper maintenance;
- Use the proper protective equipment; and
- Do not use "cheater bars" to exceed the design capacity of the tool.

Power tools include electric, pneumatic, liquid fuel, and hydraulic tools. General safety precautions for these tools include:

- Never carry a power tool by the cord or hose;
- Never yank the tool's cord or hose to disconnect from a receptacle;
- Keep cords and hoses away from heat, oil, and sharp edges;
- Disconnect tools when not in use, before servicing, and when changing accessories (i.e., blades, bits, cutters);
- Secure work items with clamps or vises to keep both hands free to operate the tool;
- Maintain good footing and balance during operation of tools;
- Never leave tools, electrical cords, or hoses where they might create a tripping hazard:
- Keep tool guards in place at all times;



- Use double insulated, three wire grounded plugs, or low voltage electric tools to prevent shock;
- Use ground fault circuit interrupters (GFCIs) for portable electric tools and when running any electric extension cords outside the building;
- Perform maintenance routinely.

5.9 SLIP, TRIP, FALL

Hazards throughout the Site include uneven terrain, holes, ditches, unstable slopes, slippery surfaces, unmarked projections, and ground debris that can cause employees to trip and fall. Sediment and surface water sampling in the river requires walking down slopes and walking on the river sediment. Take care to notice and avoid unsafe site conditions.

- Visually examine slopes for stability;
- Test your footing;
- Take sure the walking/work area is adequately lit;
- Be aware of ground debris; remove broken glass, nails, wire, and other debris if possible, or mark off and avoid areas of heavy debris.

5.10 DUST CONTROL

Vehicles must move slowly across the Site and in the area of the buildings to keep the dust down. If necessary, dust control must be achieved with a combination of work practice and engineering controls. Work practices to control exposure to dust include working upwind when possible, limiting the speed of vehicle travel at the Site, and using care to limit excess dust during work activities. Engineering controls used may include water spray or mist (especially inside buildings) other methods to keep dust down.

5.11 SITE ACCESS/SITE CONTROL

5.11.1 Site Access

Access to the SCCC Site is from Belleville Turnpike via a gate. The entire Site is fenced along its perimeter. Access to the buildings work area is from the north or west gates in fencing surrounding this area.



5.11.2 Work Zones

The Exclusion Zone is the entire inner fenced area (fencing covered with black plastic). A Decontamination Zone will be established at the north gated entrance to the Exclusion Zone. Depending on access restrictions an Exclusion Zone may be established at the western gated area. Access and egress will be restricted to the north gate and/or the west gate. To further limit the possibility of exposure or transfer of contaminated substances the number of personnel and equipment at the Site will be minimized, operations and equipment will be conducted in such a manner as to reduce exposure (minimize dust), and appropriate decontamination procedures will be implemented. A Support Zone (operations center) will be established adjacent to the gate and upwind (north or west) of the Exclusion Zone. Workers must exit the Exclusion Zone through the Decontamination Zone to enter the Support Zone and to leave the Site.

KEY and contactor personnel must abide by the work zone restrictions and work rules.

5.12 SITE HOUSEKEEPING

All equipment and non-consumables brought onto the Site locations will be decontaminated and removed from the Site at the end of the project. Used disposable clothing and equipment will be placed in plastic bags immediately upon removal and the bags closed. PPE may be placed in a drum for subsequent disposal.

5.13 SANITATION/CHANGING FACILITIES

A portable toilet will be located near the Site trailer and hand sanitizer will be available. Potable water will be available in jugs at the Site.

5.14 CONTAMINATION AND EXPOSURE PREVENTION

Work will be performed outside of buildings when feasible. Personnel must wear Level D protection at a minimum and upgrade as necessary.

5.15 BUDDY SYSTEM



Personnel will adhere to the buddy system when conducting field activities, meaning that they will work in groups of at least two while working in any exclusion zone. Worker should remain close together and maintain visual contact with each other while in the Exclusion Zone. If an emergency situation arises the workers should use the pre-arranged signals agreed upon before entry to the Exclusion Zone. Responsibilities of personnel using the buddy system include:

- Observing his/her partner for signs of chemical or heat overexposure;
- Providing his/her partner with assistance as needed;
- Periodically checking the integrity of his/her partner's PPE; and,
- Notifying the Site Manager or other on-site personnel if emergency assistance is needed.

Workers should also stay in line-of-sight or other communication with other Site personnel who can summon aid in an emergency.

5.16 SITE COMMUNICATIONS

<u>Telephones</u> - Cell phones will be used for on-Site and off-Site communication and for emergency communications.



6.0 PERSONAL PROTECTIVE EQUIPMENT

The objective of the protective equipment (PPE) program is to protect employees from safety and health hazards present at the Site and to prevent injury to workers from incorrect use and/or malfunction of PPE. No single combination of protective equipment and clothing is capable of protection against all hazards. PPE must be used in conjunction with safe work practices, decontamination, and good personal hygiene.

6.1 SITE-SPECIFIC LEVELS OF PROTECTION

The level of protection for most Site activities will be Level D or a modified Level D. Level D will consist of:

- Long or short-sleeve shirts and long pants;
- Appropriate gloves for material handling activities, as needed. Use nitrile gloves when handling building materials that may contain Site constituents;
- Steel-toe and shank safety boots;
- Hard hat:
- Safety glasses with side shields; and,
- Hearing protection as required.

Modified Level D will consist of Level D as above plus:

- Regular Tyvek (or similar material) as necessary to prevent skin contact;
- Nitrile gloves; and,
- Nitrile or other chemically resistant overboots.

6.2 UPGRADE CONDITIONS

As a precautionary measure, Level C protection must be worn inside the Distillation and the Process Building when work is performed there. Level C must also be worn if conditions should change where there is a possibility of overexposure to dust form work activities. Level C protection will consist of:

• NIOSH-approved half or full-face, air-purifying respirator equipped with appropriate combination organic vapor and P100 dust cartridges. Dust-resistant safety goggles will be required if half-face respirators are worn. Beards that interfere with respirator fit are not allowed for field personnel that will be required to wear a respirator.



Respirator cartridges must be changed at the end of each work shift and new cartridges installed before the next shift when respirators are required. Respirator cartridges also must be changed if breathing becomes difficult or if the filters become wetted.

- Chemical-resistant clothing over work clothes, regular Tyvek®, as necessary.
- Nitrile outer gloves and nitrile inner gloves.
- Steel-toe, steel shank safety boots with nitrile, butyl rubber or neoprene chemical-resistant outer boots.
- Hard hat.
- Hearing protection as required.

Organic vapor respirator cartridges may be used for one 8-hour shift only. Once a respirator cartridge is removed from the manufacturer's sealed bag it must be used or discarded.

Level B protection is not expected to be necessary during Site activities. The SHSO has the responsibility for monitoring Site and work task conditions and deciding the appropriate level of protection based on the air monitoring guidelines presented in Section 7.0 and any other indications of potential exposure.

6.3 PPE USE AND LIMITATIONS

PPE is selected to protect employees from the specific hazards that they are likely to encounter during their work on site. Selection of appropriate PPE is a complex process that must take into consideration a variety of factors. Key factors involved in this process are:

- Hazard identification:
- Potential exposure routes;
- Performance of PPE materials;
- Work tasks to be performed:
 - Durability of PPE;
 - Heat stress and task duration; and,
 - Matching of PPE to work tasks.

The more that is known about site hazards, the easier the job of PPE selection becomes. As more information about site hazards becomes available, the PSHO or SHSO can make decisions to upgrade or downgrade the level of protection to match the tasks at hand. PPE selection, evaluation, and re-selection is an ongoing process.



The following are guidelines for the selection of appropriate PPE. Site-specific information may suggest the use of combinations of PPE selected from the different levels described below as being more suitable to the hazards of the work.

Levels of Protection - Selection Criteria and Description of Categories

Levels of protection have been divided into four categories based on the degree of protection afforded:

Level A

Level A protection is selected when the greatest level of skin, respiratory, and eye protection is required. Level A should be used when:

- The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system (based on measured or potential concentrations and work functions involving a high potential for splash, immersion, or exposure)
- Substances with a high degree of hazard to the skin or are capable of being absorbed through intact skin are known or suspected to be present
- Operations must be conducted in confined, poorly ventilated areas where the absence of conditions requiring Level A has not yet been determined.

Level A equipment includes:

- 1. Pressure-demand, full facepiece, self-contained breathing apparatus (SCBA), or pressure-demand supplied-air respirator (SAR) with escape SCBA (NIOSH approved);
 - 2. Totally encapsulating chemical-protective suit;
 - 3. Coveralls*;
 - 4. Long underwear*;
 - 5. Chemical-resistant outer gloves;
 - 6. Chemical-resistant inner gloves;
 - 7. Chemical-resistant steel toe and shank boots;
 - 8. Hard hat (under suit)*;
 - 9. Disposable protective suit, gloves, and boot covers (may be worn over totally-encapsulating suit)*; and,
 - 10. Two way radios (worn inside encapsulating suit).



^{*}Optional; as applicable.

Level B is selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is required. Level B should be used when:

• The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection;

(NOTE: This involves atmospheres with IDLH concentrations of specific substances that do not present a severe skin hazard or do not meet the criteria for air purifying respirators.)

- The atmosphere contains less than 19.5 percent oxygen;
- Direct-reading instruments or organic vapor monitors detect the presence of high levels of incompletely identified gases or vapors that are not suspected to be harmful to or absorbed by the skin; and,
- When entering an uncontrolled hazardous waste site where airborne contaminant concentrations are unknown. (Note: This is minimum requirement under OSHA regulations. Level A may also be used in this situation).

Level B equipment includes:

- 1 SCBA or pressure-demand SAR with escape SCBA;
- 2 Hooded chemical-resistant clothing (coveralls; one or two piece chemical-splash suit; disposable chemical-resistant coveralls);
- 3 Coveralls*:
- 4 Chemical-resistant outer gloves;
- 5 Chemical-resistant inner gloves;
- 6 Chemical-resistant steel toe and shank boots;
- 7 Disposable boot covers, chemical-resistant*;
- 8 Hard hat:
- 9 Two way radios; and,
- 10 Face shield.*

Level C

Level C is selected when the concentration(s) and type(s) of airborne contaminants are known and the criteria for use of air purifying respirators are met. Level C should be used when:

- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- The types and concentrations of air contaminants have been identified and a canister or cartridge respirator is available that is capable of removing the contaminants; and,
- All criteria for the use of air purifying respirators are met (see Section 14.2.1.1). Level C equipment includes:
 - 1. Full-face or half-mask air purifying canister-equipped respirators (NIOSH-approved);



^{*}Optional; as applicable.

- 2. Hooded, chemical-resistant clothing;
- 3. Coveralls*;
- 4. Chemical-resistant outer gloves;
- 5. Chemical-resistant inner gloves;
- 6. Chemical-resistant steel toe and shank boots*;
- 7. Chemical-resistant disposable boot covers*;
- 8. Safety glasses with sideshields (or chemical splash goggles*);
- 9. Hard hat:
- 10. Escape respirator*;
- 11. Two way radios; and,
- 12. Face shield.*.

Level D

Level D is primarily a work uniform affording minimal protection. It should be worn only in areas where there is no possibility of contact with contamination. Level D protection should be used when:

- The atmosphere contains no known hazard; and,
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D equipment includes:

- 1. Coveralls/work clothes;
- 2. Gloves*:
- 3. Boots/shoes, leather or chemical-resistant, with steel toes and shanks;
- 4. Chemical-resistant disposable outer boots*;
- 5. Safety glasses with sideshields (or chemical splash goggles*);
- 6. Hard hat;
- 7. Escape respirator*; and,
- 8. Face shield.*

Combinations of PPE other than those described for Levels A, B, C, or D protection may be more appropriate and may be used to provide the proper level of protection.

Facial hair, long hair or stubble that may interfere with the sealing surface of a respirator is prohibited. Eyeglasses with temple pieces may not be used with respirators; a compatible



^{*}Optional; as applicable.

^{*}Optional; if applicable.

spectacle kit and lenses must be worn. There is to be no gum or tobacco chewing during respirator use.

6.4 WORK MISSION DURATION

Before workers actually begin work in their PPE ensembles, the anticipated duration of the work mission will be established. Several factors may limit mission length. These include:

- Oxygen/air supply consumption.
- Suit/ensemble penetration/permeation.
- Coolant supply.
- Ambient temperature.

For this project daily work mission length is expected to be 8 to 10 hours in Level D protection. Work missions may be shortened to include a 15-minute rest period every two hours if Level C protection is used. Also refer to Section 3.6, Heat Stress for further restrictions if heat stress may be an issue during the project duration.

6.5 PPE MAINTENANCE AND STORAGE

For this Site there is little maintenance required for Level D PPE to be used. Protective clothing and gloves are disposable; safety glasses, hard hats, and safety shoes are able to be washed clean with detergent and water. Respirators will be disassembled and cleaned and stored per manufacturer's instructions.

Clothing that will be reused must be stored properly to prevent damage or malfunction from exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures and impact. Some guidelines for general storage of chemical protective clothing include:

- Potentially contaminated clothing should be stored in an area separate from street clothing or unused protective clothing.
- Potentially contaminated clothing should be stored in a well-ventilated area, with good air flow around each item, if possible.
- Different types and materials of clothing and gloves should be stored separately to prevent issuing the wrong material by mistake (e.g. many glove materials are black and cannot be identified by appearance alone).
- Protective clothing should be folded or hung in accordance with manufacturer instructions.



6.6 PPE TRAINING AND PROPER FITTING

Workers are trained in the proper use and fitting of PPE during the initial 40-hour hazardous waste course. This training is re-emphasized during the annual 8-hour refresher training. In addition, at the start of the project employees are reminded of the proper fitting of PPE for the tasks to be performed. If respirators may be used during a project workers are also trained according to the OSHA respiratory protection standard, 29 CFR 1910.134.

At a minimum the training points out the user's responsibilities and explains the following, using both classroom and field training when necessary, as follows:

- The proper use and maintenance of selected protective clothing, including capabilities and limitations.
- The nature of the hazards and the consequences of not using the protective clothing.
- The human factors influencing protective clothing performance.
- Instructions in inspecting, donning, checking, fitting, and using protective clothing.
- Use of protective clothing in normal air for a long familiarity period.
- The user's responsibility (if any) for decontamination, cleaning, maintenance, and repair of protective clothing.
- Emergency procedures and self-rescue in the event of protective clothing/ equipment failure.
- The buddy system.

6.7 PPE DONNING AND DOFFING PROCEDURES

Donning Procedures

- Inspect clothing and respiratory equipment before donning.
- Adjust hard hat or headpiece if worn, to fit user's head.
- If wearing protective clothing Standing or sitting, step into the legs of the suit; ensure proper placement of the feet within the suit; then gather the suit around the waist.
- Put on safety boots now.
- If using a respirator Perform negative and positive respirator facepiece seal test procedures.
- To conduct a negative-pressure test, close the inlet part with the palm of the hand or squeeze the breathing tube so it does not pass air, and gently inhale for about 10 seconds. Any inward rushing of air indicates a poor fit. Note that a leaking facepiece may be drawn tightly to the face to form a good seal, giving a false indication of adequate fit.



- To conduct a positive-pressure test, gently exhale while covering the exhalation valve to ensure that a positive pressure can be built up. Failure to build a positive pressure indicates a poor fit.
- Depending on type of suit:
- Put on inner gloves.
- Additional overgloves, worn over attached suit gloves, may be donned later.
- Put on hard hat.
- Secure the suit by closing all fasteners.
- Ensure that the wearer is comfortable and that the equipment is functioning properly.

Doffing Procedures

- Remove any extraneous or disposable clothing, boot covers, outer gloves, and tape.
- Remove safety shoes or boots.
- Remove arms, one at a time, from suit.
- Leave inner gloves on, if any.
- Sitting, if possible, remove both legs from the suit.
- After suit is removed, remove internal gloves by rolling them off the hand, inside out.

6.8 PPE INSPECTION PROCEDURES PRIOR TO, DURING, AND AFTER USE

An effective chemical protective clothing inspection program should feature five different inspections:

- Inspection and operational testing of equipment received as new from the factory or distributor.
- Inspection of equipment as it is selected for a particular chemical operation.
- Inspection of equipment after use or training and prior to maintenance.
- Periodic inspection of stored equipment.
- Periodic inspection when a question arises concerning the appropriateness of selected equipment, or when problems with similar equipment are discovered.

Each inspection will cover different areas with varying degrees of depth. Those personnel responsible for clothing inspection should follow manufacturer directions.

Clothing

Before use: Determine that the clothing material is correct for the specified task at hand. Visually inspect for: Imperfect seams; non-uniform coatings; tears; and malfunctioning closures. Hold up to light and check for pinholes; flex product and observe for cracks. Check for other signs of shelf deterioration.



If the product has been used previously, inspect inside and out for signs of chemical attack: discoloration, swelling and stiffness

<u>During the work task</u>, periodically inspect for: Evidence of chemical attack such as discoloration, swelling, stiffening and softening. Keep in mind, however, that chemical permeation can occur without any visible effects. Check for closure failure, tears, punctures and seam discontinuities.

Gloves - Before use: Pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet towards fingers or inflate glove and hold under water. In either case, no air should escape.

Safety Glasses - Check for proper fit, cracks, cleanliness and visibility.

Safety Shoes/Boots - Check for cracks, tears, holes, tread wear, and proper lacing.

Respirators – Check for proper fit; conduct positive and negative fit checks. Check for cracks in facepiece; elasticity of straps and sealing surface. Make sure the facepiece is clean.

6.9 PPE IN USE MONITORING

During the work task, periodically inspect for evidence of chemical attack such as discoloration, swelling, stiffening and softening. Keep in mind, however, that chemical permeation can occur without any visible effects. Check for closure failure, tears, punctures and seam discontinuities in protective clothing. If clothing or other PPE is soiled remove the soil and or change the clothing or PPE.

6.10 EVALUATION OF THE EFFECTIVENESS OF THE PPE PROGRAM

The PPE management program is reviewed at least annually. Elements considered in the review include:



- The number of person-hours that personnel wear various forms of chemical protective clothing and other equipment;
- Accident and illness experience;
- Levels of exposure;
- Adequacy of equipment selection;
- Adequacy of the operational guidelines;
- Adequacy of decontamination, cleaning, inspection, maintenance, and storage programs;
- Adequacy and effectiveness of training and fitting programs;
- Coordination with overall safety and health program;
- The degree of fulfillment of program objectives;
- The adequacy of program records;
- Recommendations for program improvement and modification; and,
- Program costs.

On the Site, the effectiveness of the PPE program is evaluated by observing the workers for fit of equipment, proper use of equipment, wear and tear on equipment, and whether there is evidence of contamination beneath the PPE upon removal.



7.0 MONITORING

Air monitoring is an integral part of the HASP and is used to help determine the appropriate level of protection for field personnel. The SHSO, or qualified designee, is responsible for all air monitoring at the Site. Air monitoring action levels are presented on the next page. The SHSO will use these action levels when determining the need to upgrade or downgrade the level of PPE.

7.1 REAL-TIME MONITORING – VOCs

Monitoring equipment for work where there is a potential for VOC exposure will include a 10.6 volt photo-ionization detector (RAE Systems MiniRAE 2000 or equivalent). Monitoring should be performed in the breathing zone prior to and during intrusive activities and any other activities where there is a potential for exposure to VOCs. If VOCs are consistently detected above background in the work areas then additional area or personal air monitoring or sampling may be necessary to identify the VOCs contributing to PID readings. Readings may be recorded in the Site field log or on the health and safety form - the Real-Time Monitoring Log.

For any work activity, a sustained (greater than 5 minutes) PID reading in the breathing zone above the levels in the table in Section 7.4 will require vapor suppression or avoidance techniques. If these methods are not feasible or do not reduce the potential exposure below acceptable levels, then employees must upgrade to Level C protection, as necessary.

> 7.2 INSTRUMENT CALIBRATION

Monitoring equipment will be calibrated and checked for proper operation daily before the startup of any activities requiring monitoring. Before initiating field activities, background measurements will be obtained with each instrument upwind and away from potential Site influences. Instrument calibrations and background levels will be documented on daily air monitoring logs or in a field log.



7.3 VOC AIR MONITORING ACTION LEVELS

Constituent	Concentration	Location	Response
Total Organics (PID)	Above background to 0.5 ppm	Worker Breathing Zone – Intrusive activities	Continue monitoring until reading drops to background or other action is called for.
Total Organics (PID)	0.5 to 5 ppm	Worker Breathing Zone –Intrusive activities	Use detector tubes to check for benzene.
Total organic vapors (and benzene below 0.5 ppm.)	5 to 25 ppm	Worker Breathing Zone – intrusive activities	Upgrade to Level C – half or full- face respirator with combination organic vapor and P100 dust cartridges.
Total organic vapors (and benzene below 0.5 ppm.)	Above 25 ppm	Worker Breathing Zone – intrusive activities	If vapors cannot be controlled, stop work and evacuate the area until vapors dissipate. Monitor from a distance.
Total Organics (PID)	Consistently above background.	Worker Breathing Zone – intrusive activities	Arrange for air sampling to identify and quantify the potential VOCs.

7.4 REAL-TIME MONITORING - DUST

Monitoring for dust will be conducted prior to and during potential dust generating activities in the areas of concern. A portable aerosol monitor will be used to obtain real-time measurements of dust concentrations upwind, downwind, and cross wind of the work activities and in areas representative of the worker's breathing zone. A Personal DataRAM, or similar instrument, will be used for dust monitoring. Personnel work zone and perimeter dust monitoring will be performed and recorded at the start of potential dust generating operations such as excavating and loading/unloading of trucks, and stockpiling of soil and other dust generating activities. Upwind, background concentrations as well as work area and downwind perimeter area monitoring will be recorded before the start of work and at least every 2 hours during dust generating activities.

For any work activity, a sustained (greater than 5 minutes) dust level in the breathing zone above the concentrations in the following table will require additional dust suppression techniques or



working upwind of the contamination. If these methods are not feasible or do not reduce the potential exposure below acceptable levels, then employees must upgrade to Level C protection.

Dust measurements will be made following the manufacturer's instructions on instrument operation and maintenance. The complete manufacturer's operations manual will be on-site at all times.

7.5 AIR MONITORING ACTION LEVELS - DUST

Constituent	Concentration	Location	Response
Dust	Visible	Work zone	Control source of dust.
Dust	0 to 3 mg/m ³	Worker's breathing zone	Continue monitoring during work activities.
Dust	Above 3 mg/m ³	Worker's breathing zone	Control source of dust. If dust cannot be controlled upgrade to Level C protection.



8.0 MATERIAL HANDLING AND DECONTAMINATION

All waste material, decontamination liquids, and decontamination equipment will be handled in a safe and healthful manner. Decontamination and material handling activities will be carried out within the appropriate work zone.

8.1 DECONTAMINATION

For sampling and monitoring activities decontamination may consist of removing and disposing of soiled gloves and cleaning or disposing of soiled equipment and materials. When construction activities are planned a personnel and equipment decontamination area will be provided by the Construction Contractor where surface contamination and outer protective equipment are removed. This area will be determined upon arrival at the Site and before any intrusive activities begin. The KEY representative should be careful to verify appropriate decontamination depending on the procedures implemented.

8.1.1 Personnel Decontamination

During regular maintenance, sampling and monitoring personnel decontamination consists of removal and disposal of gloves after use then washing with soap and water.

The general decontamination procedure during construction activities is as follows.

Level D Decontamination:

- Equipment drop onto plastic drop cloth.
- Wash and rinse boot covers and gloves if to be reused.
- Remove and dispose of Tyvek® suit in a plastic-lined container or plastic bag.
- Remove boot covers and gloves, dispose in plastic bag or lined containers if not to be reused. Place in "decontaminated PPE" container if to be used again.
- Field-wash hands and face.



Level C Decontamination:

- Equipment drop onto plastic drop cloth.
- Wash and rinse boot covers and outer gloves if to be reused.
- Remove boot covers and other gloves; dispose in plastic bag or lined container if not to be reused. Place in "decontaminated PPE" container if to be used again.
- Remove and dispose of Tyvek® suit in a plastic bag or plastic-lined container.
- Wash and rinse inner gloves.
- Remove respirator and place in bin for later cleaning.
- Remove and dispose inner gloves.
- Field-wash face and hands.

There may be partial field decontamination before traveling from one work location to another. This may consist of removing or cleaning boots and gloves after completing an activity and before moving to the next work station. The SHSO will advise the field crew of any necessary field decontamination procedures.

Respirators, non-disposable protective clothing, and other personal articles must be sanitized before they can be used again unless they are assigned to individuals. The SHSO is responsible for monitoring the effectiveness of decontamination procedures and modifying the procedures as necessary to ensure proper decontamination.

8.1.2 Equipment Decontamination

All equipment used in an exclusion zone must be decontaminated before it leaves the Site or is taken into a clean area. Small tools and equipment used in the EZ that become contaminated may be taken to the decontamination area taking care to isolate the tools/equipment from clean materials and equipment. Equipment may be decontaminated by steam cleaning, washing with detergent and water then rinsing, or other appropriate decontamination methods as detailed in the Work Plan for the Site. Verification that equipment/vehicles leaving the Site have been adequately decontaminated is the responsibility of the SHSO.



9.0 EMERGENCY PROCEDURES

Emergency telephone numbers, directions to the nearest hospital, and a route map to the hospital are presented in **Appendix C**.

9.1 SITE TOPOGRAPHY AND LAYOUT

The Site is located on relatively flat terrain; however a lagoon, marshland, standing water, thick brush, and ditches are present on some areas of the Site.

9.2 OVERVIEW

Pre-emergency planning consists of the preparation of this emergency response plan, posting of the emergency contact list and hospital route map, assigning emergency functions to on-Site personnel, training of personnel as necessary, and ensuring that emergency procedures and equipment are in place.

The KEY supervisor/SHSO is designated as the Site Emergency Coordinator for KEY's activities and is responsible for field implementation this emergency response plan and has full authority for KEY personnel and KEY subcontractors in the event of an emergency. If outside agencies respond to an emergency the Site Emergency Coordinator will pass the responsibility and authority for emergency response to the Incident Commander for the outside agency as appropriate. The Site Emergency Coordinator will assist outside emergency response agencies as much as possible to control and resolve the emergency. In general, on-site personnel would immediately evacuate the area to the designated safe place of refuge. Communications consist of verbal and hand signals on-site and use of a portable telephone for off-site communication.

The Site Emergency Coordinator, or if the Site Emergency Coordinator is unavailable, the designated alternate on Site, will contact emergency personnel. In the event of severe injury to KEY personnel or subcontractors, KEY may start first aid then contact outside personnel for assistance.



PPE and emergency equipment will be available on-Site for response to minor emergencies. PPE includes gloves, protective clothing, protective booties, and safety glasses.

Safe distances and places of refuge will be upwind of the site activities and will be determined at the time of the emergency based on a combination of site-specific and incident-specific factors. Evacuation routes and places of refuge will be determined before the start of work at the Site and the locations made known to all personnel who enter the Site. The SHSO will maintain security around the immediate Site work zones. Because of the limited number of personnel expected to be working on the Site, the SHSO will know who is on Site and can control entry of personnel into hazardous areas in an emergency.

There are several potential causes of emergencies at hazardous waste sites. Worker-related emergencies may include:

- Minor accidents like slips, trips, and falls.
- Chemical exposure.
- Medical problems such as heat stress, heat stroke and aggravation of pre-existing conditions.
- Failure of personal protective equipment (tearing or permeation of protective clothing).
- Physical injury, e.g., from flying objects, loose clothing entangled in machinery, serious falls.
- Electrocution.

Waste-related emergencies may include:

- Fire.
- Explosion.
- Leaks.
- Release of toxic vapors.
- Incompatible reactions.
- Collapse of containers.

All personnel, especially the supervisors and SHSO, must be constantly alert for indicators of potentially hazardous situations and for symptoms in themselves and others that warn of



hazardous conditions and exposures. Before daily assignments the tasks to be performed, time constraints, potential hazards and emergency procedures are reviewed.

Hazard/Recognition	Emergency Action
Fire/explosion – flames/smoke/heat	If small fire use fire extinguisher to put out. If fire spreads beyond control of employees, call the local fire department at 911.
Minor accidents and physical injury	First-aid trained person to examine victim and treat as needed. If more than first-aid is required summon ambulance or transport or hospital.
Chemical exposure (dust, PAHs)	Wash skin, flush eyes. Put sun lotion on affected area and cover skin. See a physician if severe reaction. See first aid procedures below.
PPE in poor condition or missing.	Stop work and ensure that employees wear proper PPE.

Emergency alerting on-site consists of the use of hand signals and/or radio/cell phone communication. Cell phones will be used for off-site communication. Workers notify the Site Supervisor or SHSO of any emergency. The Site Supervisor or SHSO decides the appropriate action and implements emergency procedures.

Pre-emergency planning consists of the preparation of this emergency response plan, keeping the emergency contact list and hospital route map in the Site vehicle and ensuring that a first aid kit is available.

The sampling personnel are responsible for their own safety and for contacting emergency services as necessary. A cell phone will be used for off-site communication.

9.3 EMERGENCY MEDICAL TREATMENT AND FIRST AID

In the event of a safety or health emergency at the Site, appropriate emergency measures will immediately be taken to assist those who have been injured or exposed and to protect others from hazards. The project field personnel will take the injured party and transport (if possible) to the



nearest hospital for treatment, after determining whether personnel decontamination can be performed on the injured party.

If the injury to a worker is chemical in nature (e.g., overexposure), the following first-aid procedures will be instituted:

- Eye Exposure If a solid or liquid gets into the eyes, wash the eyes immediately at
 the emergency eyewash station using large amounts of water and lifting the lower and
 upper lids occasionally to help flush the eye. Do not let the victim rub eyes or keep
 eyes tightly closed. Flush for at least 15 minutes. Obtain medical attention immediately.
- <u>Skin Exposure</u> Promptly wash the area using mild soap and flooding amounts of water for at least 15 minutes while removing contaminated clothing and shoes. Consult a physician for reddened or blistered skin.
- <u>Swallowing</u> Do not induce vomiting! Never give anything by mouth to an unconscious person. Call poison control center: 1-800-222-1222.
- Breathing If a person has difficulty breathing, move the exposed person to fresh air at once. Do not use mouth-to-mouth respiration. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and mask. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

9.4 EMERGENCY EVALUATION, INVESTIGATION, AND DOCUMENTATION

The KEY Project Manager and/or KEY Health & Safety Manager will evaluate the available information about the incident and KEY's emergency response about what happened, any injuries or casualties, further accident potential, and what can be done to remedy the emergency. The type of response will be based on the available information about the emergency incident.

The emergency incident will be investigated and all findings put in writing as soon as conditions return to normal. Ensure that documentation is as complete as possible by including a chronological history of the incident, facts about the incident and when they became available, titles and names of personnel, actions taken, samples and results, possible exposures, and history of all injuries or illness during or as a result of the emergency. After the situation has returned to normal, all aspects of the emergency incident and the response will be reviewed to assess procedures used, how to improve response, and how to prevent further emergencies.



9.5 SPILL CONTAINMENT

Any spill or release of oil, hydraulic fluid or other potentially hazardous substance; either from Site operations or from the buildings, will be cleaned up immediately and containerized as appropriate. Sorbent material, shovels and drums will be are available on-site to handle spills of materials.



10.0 TRAINING

10.1 GENERAL

All employees or other personnel entering the Site Exclusion Zone(s) or Decontamination Zone that are also involved in operations which could involve exposure to hazardous waste will receive training in compliance with OSHA 29 CFR 1910.120.

The training requirements are intended to provide employees with the knowledge and skills necessary to perform hazardous waste Site operations while minimizing the potential for injury. Initial training consists of a minimum of 40 hours of off-Site classroom and practical exercise training and 3 days of actual field experience. Training must be updated annually with 8 hours of off-Site training. Supervising personnel will complete an 8-hour training session for supervisors. Training will be certified by record and/or certificate.

Initial 40-hour off-site training for hazardous waste site workers consists of classroom coursework and practical exercises that include:

- Safety, health and other hazards present at hazardous waste sites;
- Selection and use of personal protective equipment;
- Work practices to minimize risks from site hazards;
- Safe use of engineering controls and equipment on sites;
- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards;
- Site control measures;
- Decontamination procedures; and,
- Emergency response and contingency planning.

In addition to the 40-hour training, site workers perform actual field activities for at least 3 days under the direct supervision of a trained, experienced supervisor.

Supervisors who are responsible for directing others receive the same training as general site workers plus an additional 8 hours of training on topics such as the overall corporate health and



safety program and employee training program, management of site zones, PPE, spill containment, monitoring procedures and techniques, and supervisory skills.

Annual 8 hour refresher training is required for all field personnel. This training consists of a review of the elements of the 40-hour course, critique of the past year's incidents, and other relevant topics. Information and training on new technologies or equipment for the improved protection of employees is also presented.

All construction employees are required to have the 40-hour initial training. There are no site-specific task limitations on this project that qualify on-site construction personnel for the 24-hour minimum initial training. Workers on site for a specific limited task, such as land surveying, and who are unlikely to be exposed over permissible exposure limits and published exposure limits must have a minimum 24 hours of off-site instruction and a minimum one day actual field experience under the direct supervision of a trained, experienced supervisor.

Personnel responding to Site emergencies have the training and experience to recognize, evaluate, and respond to expected emergency situations. Training includes first aid/CPR courses and the 8-hour supervisor course.

10.2 SITE-SPECIFIC TRAINING

Site-specific training will consist of a health and safety briefing on the following information before the personnel collecting samples travels to the Site:

- Names of individuals responsible for Site health and safety and methods of communicating safety and health concerns;
- Site-specific health and safety hazards;
- Use of PPE;
- Work practices by which employees can minimize risk;
- Safe use of equipment on-Site;
- Recognition of symptoms and signs of exposure to hazardous materials;
- Site control measures;
- Decontamination procedures; and.



• Emergency response procedures.

The Health and Safety Manager or designee will give the health and safety briefing prior to initiation of field activities. This briefing will be of sufficient duration to address all of the material covered in this HASP. All personnel that will be participating in field activities will have had the opportunity to read this HASP prior to this initial meeting so that any questions they have can be addressed at the initial meeting.

10.3 SAFETY MEETINGS

Prior to commencing field activities each day, a short briefing will be conducted by the Site Supervisor to address the day's activities. The daily briefing will provide the opportunity for the SHSO to address any special health and safety issues and to notify individuals of any deficient areas that need to be corrected or operational changes made that affect field work. The briefing will emphasize the specific concerns associated with the day's planned field activities. Daily weather reports will be reviewed to determine work/rest regimens.



TABLES



TABLE 1

Exposure Limits and Other Properties of Principal Constituents of Interest Standard Chlorine Chemical Company Site Kearny, NJ

Chemical Compound	Exposure Limits ^[b]	STEL [6]	IDLH ^[d]	Vapor Pressure ^[e]	Ionization Potential ^(f)
Coal Tar Pitch Volatiles (PAHs) ^[a]	0.2 mg/m ³	NE	80 mg/m ³	Varies	Varies
Naphthalene	10 ppm	15 ppm	250 ppm	0.08 mm	8.12 eV
Benzene	0.5 ppm	5 ppm	500 ppm	75 mm	9.24 eV
Ethylbenzene	100 ppm	125 ppm	800 ppm	7 mm	8.76 eV
Toluene	50 ppm	NE	500 ppm	21 mm	8.82 eV
Xylene	100 ppm	150 ppm	900 ppm	9 mm	8.56 eV
Chlorobenzene	10 ppm	NE	1,000 ppm	9 mm	9.07 eV
1,2-Dichlorobenzene	25 ppm	50 ppm	200 ppm	1 mm	9.06 eV
1,4-Dichlorobenzene	10 ppm		150 ppm	1.3 mm	8.98
1,2,4-Trichlorobenzene		5 ppm (c)	100 ppm	19 mm	11.00 eV
Dioxin	Not established		Not established	?	?
Asbestos	0.1 fiber/cc	NA	NA	NA	NA

Chemical Compound	Carcinogen ^(g)	Skin Exposure ^(b)	LEL/UÉL ^{II} I	Odor Threshold ^(j)	3M/NIOSH Respirator Selection ^[k]
Coal Tar Pitch Volatiles (PAHs)	YES	YES			R95 or P95
Naphthalene	YES	NO	0.9 - 5.9%	0.015 ppm	ov
Benzene	YES	NO	1.2 - 7.8%	8.65 ppm	ov
Ethylbenzene	NO	NO	0.8 - 6.7%	2.3 ppm	ov
Toluene	NO	YES	1.1 - 7.1%	0.16 ppm	OV
Xylene	NO	NO	1.0 – 7.0%	0.324 ppm	ov
Chlorobenzene ,	NO	NO	1.3-9.6%	0.741 ppm	ov
1,2-Dichlorobenzene	NO	NO	2.2-9.2	0.072 ppm	(F)OV
1,4-Dichlorobenzene	YES	NO	2.5-?	0.048 ppm	(F)OV/N95
1,2,4-Trichlorobenzene	YES	NO	2.5-6.6	2.91 ppm	ov
Dioxin	YES	YES	?	?	OV/P100
Asbestos	YES	NO	NA	NA	N100



TABLE 1 (cont.) Exposure Limits and Other Properties of Principal Constituents of Interest Standard Chlorine Chemical Company Site Kearny, NJ

Notes:

- [a] OSHA has not established individual exposure limits for most PAHs. Coal Tar Pitch Volatiles is a category containing several compounds, most of which are classified as PAHs; so Coal Tar Pitch Volatiles can be used as a surrogate for PAHs.
- [b] Exposure Limit: 8-hour Time Weighted Average (TWA) from the 2008 Threshold Limit Values of the ACGIH, or OSHA Permissible Exposure Limit (PEL), whichever is lower.
- [c] STEL: Short Term Exposure Limit denotes a 15 minute average that may not be exceeded:
- [d] IDLH: Immediately Dangerous to Life or Health Maximum concentration from which one could escape within 30 minutes without a respirator and without experiencing any irreversible health effects.
- [e] Vapor Pressure: From NIOSH Pocket Guide to Chemical Hazards. Water = 0 mm. Above 1 mm is considered volatile; above 100 mm is considered highly volatile
- [f] Ionization Potential: Expressed in electron volts (eV) from NIOSH Pocket Guide to Chemical Hazards. Used to determine type of detector bulb for the PID.
- [g] Carcinogen: "Yes" indicates compound is a confirmed or suspected human carcinogen by NIOSH, OSHA or ACGIH.
- [h] Skin Exposure: "Yes" indicates potential significant exposure through skin and mucous membranes, either by airborne or, more particularly, by direct contact to ambient vapors.
- [1] LEL/UEL: Lower and upper explosive limits. Percent of material needed in air for ignition when exposed to an ignition source.
- [j] Odor Threshold: Air concentration at which most people can smell the chemical.
- [k] 3M/NIOSH Respirator Selection: Type of respirator recommended by the 3M 2008 Respirator Selection Guide or the NIOSH Pocket Guide to Chemical Hazards. SA = Supplied Air (Level B); OV = Organic Vapor Respirator (Level C); N, R, or P 95, 97, or 100 = Dust and mist respirator (Level C).



TABLE 2

Task-Specific Hazard Assessment with Proposed Initial Levels of Protection and Air Monitoring Requirements Standard Chlorine Chemical Company Site Kearny, NJ

Task	Chemical Assess	Hazard	Estimated Initial Level	Real-Time Air Monitoring		
	-VOCs/SVOCs	Asbestos	of Protection*	VOCs/SVOCs	Dust	
Mobilization/Demobilization	LOW	LOW	D	NO	NO	
Exterior Work	LOW-MED	LOW	D	YES	YES	
Interior Work	LOW-MED	LOW	D	YES	YES	
Interior Work – Distillation and Process Buildings	MED	LOW	С	YES	YES	
Decontamination of Equipment	LOW	MED	. D	YES	YES	

^{*} Also wear nitrile gloves for activities where there may be hand contact with potentially impacted surfaces.



FIGURES







SCCC SUPERFUND SITE NORTHEASTERN AREA BUILDINGS CLOSURE OF BUILDINGS WORK PLAN

STANDARD CHLORINE CO. INC. KEARNY, NEW JERSEY

DATE: 06/23/09 DRWN: DJB CHKD: JAB DATE: 06/23/09 APPD: JSW SCALE: DATE: 06/23/09

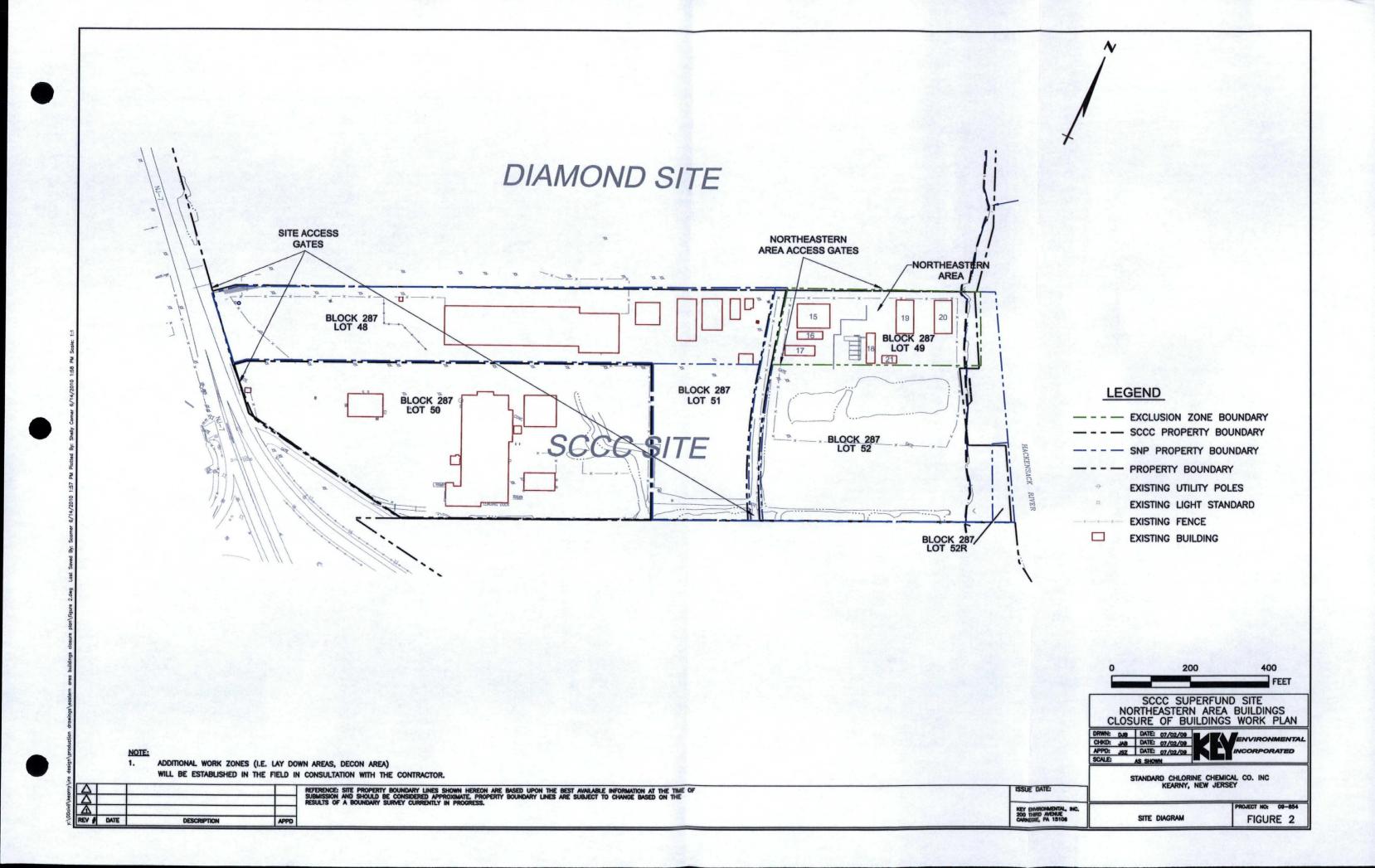
REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES OF JERSEY CITY, AND WEEHAWKEN, NEW JERSEY

KEY ENVIRONMENTAL, 200 THIRD AVENUE CARNEGIE, PA 15106

FIGURE 1

SSUE DATE: 06/23/09

SITE LOCATION MAP



APPENDIX A MATERIAL SAFETY DATA SHEETS



MSDS Number: T4875 * * * * * Effective Date: 08/12/02 * * * * * Supercedes: 04/10/00



Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151

CHEMTREC: 1-800-424-9300

National Response in Canada CANUTEC: 613-998-6666

Outside U.S. And Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,2,4-Trichlorobenzene

1. Product Identification

Synonyms: unsym-Trichlorobenzene

CAS No.: 120-82-1

Molecular Weight: 181.45 Chemical Formula: C6H3Cl3

Product Codes: 9444

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
		i	
1,2,4-Trichlorobenzene	120-82-1	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND REPRODUCTIVE SYSTEM. VAPOR CAUSES RESPIRATORY TRACT IRRITATION AND SEVERE EYE IRRITATION. LIQUID CAUSES SKIN AND EYE IRRITATION.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

1,2,4-Trichlorobenzene

Page 2 of 7

Health Rating: 3 - Severe (Poison) Flammability Rating: 1 - Slight Reactivity Rating: 0 - None Contact Rating: 3 - Severe (Life)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER

GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Inhalation may lead to drowsiness, uncoordination, narcosis, liver damage, headache, increased heart rate and blood pressure, and tremors.

Ingestion:

Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Other symptoms may parallel those from inhalation. Ingestion of a few ounces could prove fatal.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain. Prolonged contact may cause skin burns. May be absorbed through the skin with possible systemic effects.

Eye Contact:

Vapors and liquid cause irritation, redness and pain. Vapor concentrations over 5 ppm can cause severe irritation.

Chronic Exposure:

Prolonged or repeated exposure may affect lungs, liver, kidneys, and skin. May have teratogenic effects.

Aggravation of Pre-existing Conditions:

Persons with pre-existing disorders of the blood, skin, liver, kidneys or lungs may be at an increased risk from exposure.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 105C (221F) CC

Flammable limits in air % by volume:

lel: 2.5; uel: 6.6

Upper and lower explosive limits were measured at 150C (302F).

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

ACGIH STEL:

5 ppm (Ceiling)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying

respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Characteristic aromatic odor.

Solubility:

Negligible (< 0.1%)

Specific Gravity:

1.45 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

213C (415F)

Melting Point:

17C (63F)

Vapor Density (Air=1):

6.26

Vapor Pressure (mm Hg):

1 @ 38.4C (100F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Acids, acid fumes, oxidizers, steam.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Oral, rat, LD50: 756 mg/kg; Skin, rat, LD50: 6319 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

May cause teratogenic effects.

Carcinogenicity:

EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

\Cancer Lists\			
•	NTP (Carcinogen	
Ingredient	Known	Anticipated	IARC Category
1,2,4-Trichlorobenzene (120-82-1)	No ·	No ·	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is not expected to leach into groundwater. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is not expected to be degraded by photolysis. When released into air, this material is expected to have a half-life between 10 and 30 days.

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 1 and 10 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROBENZENES, LIOUID

Hazard Class: 6.1 UN/NA: UN2321 Packing Group: III

Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROBENZENES, LIQUID

Hazard Class: 6.1 UN/NA: UN2321 Packing Group: III

Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: TRICHLOROBENZENES, LIQUID

Hazard Class: 6.1 **UN/NA: UN2321** Packing Group: III

Information reported for product/size: 4L

15. Regulatory Information

\Chemical Inventory Status - Part Ingredient	1\	TSCA	EC	Japan	Australi	.a
1,2,4-Trichlorobenzene (120-82-1)		Yes	Yes	Yes	Yes	
\Chemical Inventory Status - Part	2\			 mada		. – –
Ingredient		Korea			Phil.	
1,2,4-Trichlorobenzene (120-82-1)		Yes	Yes	No	Yes	
\Federal, State & International I	Regulati -SARA	ons -	Part 1	L\ SAR	 A 313	· · ,
Ingredient	RQ	TPQ			mical Cat	
1,2,4-Trichlorobenzene (120-82-1)				3		
\Federal, State & International I	Regulati	ons -		2\ T:		<i>'</i> _
Ingredient	CERCL	A	261.33	8	(d)	
1,2,4-Trichlorobenzene (120-82-1)			No	N	, O	

CDTA: No Chemical Weapons Convention: No TSCA 12(b): Yes SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2Z Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND REPRODUCTIVE SYSTEM. VAPOR CAUSES RESPIRATORY TRACT IRRITATION AND SEVERE EYE IRRITATION. LIQUID CAUSES SKIN AND EYE IRRITATION.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling?

Avoid breathing vapor or mist.

Keep container closed.

Use only with adequate ventilation.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

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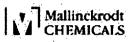
Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **D2208** * * * * * Effective Date: 11/12/03 * * * * * Supercedes: 02/23/01

MSDS

Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Rod School Lane Phillipsburg, NJ 08865





24 Hour Emergency Telephone; 908-859-2151 CHEMTREC; 1-800-424-9300

National Response in Canada CANUTEC: 613-996-6666

Outside U.S. and Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Cemer emergency numbers to be used only in the event of chemical emergencies involving a spill, loak, tire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

O-DICHLOROBENZENE

1. Product Identification

Synonyms: 1,2-dichlorobenzene; ortho-Dichlorobenzene; DCB

CAS No.: 95-50-1

Molecular Weight: 147.00 Chemical Formula: C6H4Cl2

Product Codes: J.T. Baker: 9217, 9233 Mallinckrodt: 1830

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
o-Dichlorobenzene	95-50-1 106-46-7	> 99%	Yes
p-Dichlorobenzene	106-46-7	0 - 0.16%	res

3. Hazards Identification

Emergency Overview

DANGER! ASPIRATION MAY CAUSE LUNG DAMAGE. VAPORS CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT. LIQUID CAUSES SKIN IRRITATION AND SEVERE EYE IRRITATION. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS LIVER, KIDNEYS AND BLOOD. COMBUSTIBLE LIQUID AND VAPOR. POSSIBLE

O-DICHLOROBENZENE Page 2 of 8

CANCER HAZARD. CONTAINS P-DICHLOROBENZENE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends upon duration and level of exposure.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 2 - Moderate

Reactivity Rating: 0 - None Contact Rating: 1 - Slight

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B

EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Can cause headache, nausea, swelling around the eyes, runny nose, loss of appetite and weight loss. Higher concentrations may cause drowsiness, central nervous system depression, kidney and liver damage, unconsciousness, and death.

Ingestion:

Toxic! A liver and kidney poison. May cause systemic poisoning with/symptoms paralleling inhalation. May be an aspiration hazard if swallowed.

Skin Contact:

Skin contact causes irritations and possibly burns if contact is repeated or prolonged. May be absorbed through the skin.

Eye Contact:

Vapors cause irritation, redness, and pain. Contact with liquid may cause burning of the eyes and tissue damage.

Chronic Exposure:

Chronic exposure may damage blood, liver and kidneys. p-Dichlorobenzene is a possible carcinogen. Prolonged or repeated skin exposure may cause dermatitis and blisters. Prolonged or repeated exposure through any route may cause symptoms paralleling acute inhalation.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin problems, kidney or liver damage may be more susceptible to the affects of this material.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids

occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 66C (151F) CC

Autoignition temperature: 648C (1198F) Flammable limits in air % by volume:

lel: 2.2; uel: 9.2 Combustible. **Explosion:**

Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

50 ppm Ceiling limit

for p-Dichlorobenzene: 75 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

25 ppm (TWA) 50 ppm (STEL), listed as A4, Not classifiable as a human carcinogen for p-Dichlorobenzene: 10 ppm (TWA), listed as A3, animal carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Page 4 of 8

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge and dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. This compound possibly exists in both particulate and vapor phase. A dust/mist prefilter should be used for the particulate.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Colorless to yellowish liquid.

Odor:

Pleasant odor.

Solubility:

Practically insoluble in water.

Specific Gravity:

1.30 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

180C (356F)

Melting Point:

-17.6C (0F)

Vapor Density (Air=1):

5.1

Vapor Pressure (mm Hg):

1.2 @ 20C (68F)

Evaporation Rate (BuAc=1):

< 1

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

May emit oxides of carbon and hydrogen chloride gas when heated to decomposition. May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizers, aluminum or aluminum alloys.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 500 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

\Cancer Lists\				
	NTP Carcinogen			
Ingredient	Known	Anticipated	IARC Category	
o-Dichlorobenzene (95-50-1)	No	No	3	
p-Dichlorobenzene (106-46-7)	No	Yes	2B	

12. Ecological Information

Environmental Fate:

When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. Although this material has a relatively short half-life in water, it can also readily be adsorbed to sediment and persist for decades. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material may bioaccumulate to some extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into air, this material is expected to have a half-life between 10 and 30 days.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: O-DICHLOROBENZENE

Hazard Class: 6.1 UN/NA: UN1591 Packing Group: III

Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: ORTHO-DICHLOROBENZENE

Hazard Class: 6.1 UN/NA: UN1591 Packing Group: III

Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: ORTHO-DICHLOROBENZENE

Hazard Class: 6.1 UN/NA: UN1591 Packing Group: III

Information reported for product/size: 4L

75. Regulatory Information

\Chemical	Inventory Status - Par	ct 1\					
Ingredient		· 	TSCA		Japan		lia
o-Dichlorobenzene			Yes	Yes	Yes	Yes	
p-Dichlorobenzene	(106-46-7)		Yes	Yes	Yes	Yes	
\Chemical	Inventory Status - Par	t 2\					
				Ca	anada		
Ingredient			Korea				
o-Dichlorobenzene	(95-50-1)	· 	Yes	Yes		Yes	
p-Dichlorobenzene	(106-46-7)		Yes	Yes	No	Yes	
\Federal,	State & International				1\ SAR		
Ingredient		RQ			st Che		
o-Dichlorobenzene	(95-50-1)	No	No	Yes	3	No	
p-Dichlorobenzene	(106-46-7)	No	No	Yes	3	No	
\Federal,	State & International	Regulati	ons -				
T			_	-RCRA-		SCA-	
Ingredient		CERCL	A	261.33	8	(d)	
o-Dichlorobenzene	(95-50-1)	100	_	U070	No	 O	
p-Dichlorobenzene	(106-46-7)	100		U072	No	-	

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No

Reactivity: No

(Mixture / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z **Poison Schedule:** None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 2 Reactivity: 0

Label Hazard Warning:

DANGER! ASPIRATION MAY CAUSE LUNG DAMAGE. VAPORS CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT. LIQUID CAUSES SKIN IRRITATION AND SEVERE EYE IRRITATION. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS LIVER, KIDNEYS AND BLOOD. COMBUSTIBLE LIQUID AND VAPOR. POSSIBLE CANCER HAZARD. CONTAINS P-DICHLOROBENZENE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends upon duration and level of exposure.

Label Precautions:

Do not breathe vapor.

Do not get in eyes, on skin, or on clothing.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Keep away from heat and flame.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

1,3-Dichlorobenzene, 98%

ACC# 62847

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,3-Dichlorobenzene, 98%

Catalog Numbers: AC151180000, AC151180010, AC151180050, AC151180250, AC151181000, AC151182500

AC151182500, AC151185000

Synonyms: m-Dichlorobenzene; Benzene, 1,3-dichloro-; m-Phenylenedichloride

Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01 For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS	
541-73-1	1,3-Dichlorobenzene	98	208-792-1	

Hazard Symbols: XN N Risk Phrases: 22

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear - Colorless Liquid. Flash Point: 67 deg C. **Combustible liquid and vapor. Warning!** Causes eye and skin irritation. Causes digestive and respiratory tract irritation. Harmful if swallowed. May be absorbed through intact skin.

Target Organs: Kidneys, liver.

Potential Health Effects

Eye: Causes eye irritation.

Skin: Causes skin irritation. May be absorbed through the skin.

Ingestion: Harmful if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation: Causes respiratory tract irritation.

Chronic: Chronic exposure may cause liver damage. Chronic exposure may cause kidney damage.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.

Get medical aid immediately.

Skin: Get medical aid immediately. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give

anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Combustible liquid. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.

Extinguishing Media: Do NOT get water inside containers. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.

Flash Point: 67 deg C (152.60 deg F)

Autoignition Temperature: 640 deg C (1,184.00 deg F)

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water. Stop leak only if you can do so without risk.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. **Exposure Limits**

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,3-Dichlorobenzene	none listed	none listed	none listed

OSHA Vacated PELs: 1,3-Dichlorobenzene: No OSHA Vacated PELs are listed for this chemical. **Personal Protective Equipment**

yes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face otection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2

requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: Clear - Colorless Liquid

Odor: None reported. pH: Not available.

Vapor Pressure: 1.8 hPa @ 20 C

Vapor Density: 5.07

Evaporation Rate:Not available. Viscosity: 1.045 cP 23 deg C

Boiling Point: 172.0 - 173.0 deg C @ 760.00m

Freezing/Melting Point:-24 deg C

Decomposition Temperature:> 300 deg C

Solubility: Insoluble.

Specific Gravity/Density: 1.2880g/cm3

Molecular Formula:C6H4Cl2 Molecular Weight:147.00

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, ignition sources, excess heat. Incompatibilities with Other Materials: Strong oxidizing agents, aluminum.

Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 541-73-1: CZ4499000

LD50/LC50: Not available.

Carcinogenicity: CAS# 541-73-1:

IARC: IARC Group 3 - not classifiable Epidemiology: No information.
Teratogenicity: No data available.
Reproductive Effects: No information.

Neurotoxicity: No information.

Mutagenicity: Gene conversion and mitotic recombination: Saccharomyces cerevisiae =5ppm.; Micronucleus

test-Intraperitoneal, mouse = 175 mg/kg/24H.

Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: 12.7 mg/L; 96 Hr; Static Bioassay Experimental BCF Values of 89-740 reported, and 1,3-Dichlorobenzene was detected in trout in Lake Ontario. Koc values of 12600-31600 calculated from sediment/water monitoring data in Great Lakes Area. An experimental Koc value of 293 was calculated in a

silt loam soil containing 1.9% organic matter. 1,3-Dichlorobenzene can be moderately to highly absorbed to soil. Leaching can occur.

Environmental: No information available.

Physical: No information available.

Ther: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: CAS# 541-73-1: waste number U071.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	TOXIC LIQUIDS, ORGANIC, N.O.S.				No information available.
Hazard Class:	6.1	,		· '	
UN Number:	UN2810			£	1
Packing Group:	III				

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 541-73-1 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

CAS# 541-73-1: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 541-73-1: acute, chronic, flammable.

Section 313

This material contains 1,3-Dichlorobenzene (CAS# 541-73-1, 98%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

his material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone epletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 541-73-1 is listed as a Priority Pollutant under the Clean Water Act. CAS# 541-73-1 is listed as a Toxic Pollutant under the

Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 541-73-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California No Significant Risk Level: None of the chemicals in this product are listed.



European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 22 Harmful if swallowed.

R 51/53 Toxic to aquatic organisms, may cause

long-term adverse effects in the aquatic environment.

Safety Phrases:

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 541-73-1: 2

Canada - DSL/NDSL

CAS# 541-73-1 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B3, D1B, D2A.

Canadian Ingredient Disclosure List

CAS# 541-73-1 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

Section 16 - Additional Information

MSDS Creation Date: 11/03/1998 **Revision #3 Date:** 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **D2224** * * * * * * Effective Date: **08/10/04** * * * * * Supercedes: **11/02/01**



Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151

CHEMTREC: 1-800-424-9300

National Response in Canada CANUTEC: 613-998-6666

Outside U.S. And Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

p-DICHLOROBENZENE

1. Product Identification

Synonyms: 1,4-Dichlorobenzene; para-dichlorobenzene; Paracide; PDCB

CAS No.: 106-46-7

Molecular Weight: 147.01 Chemical Formula: C6H4Cl2

Product Codes: G970

2. Composition/Information on Ingredients

Ingredient	CAS No	ί	Percent	Hazardous
		-		- -,-
p-Dichlorobenzene	106-46-7		100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)

Flammability Rating: 2 - Moderate

Reactivity Rating: 0 - None Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B

EXTINGUISHER.

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of dust or vapors can irritate the nose and throat. May also cause headache, swelling around the eyes and runny nose. Can cause loss of appetite, nausea, vomiting, central nervous system effects, weight loss and liver and kidney damage.

Ingestion:

Toxic. Swallowing can produce adverse health effects paralleling inhalation.

Skin Contact:

Causes skin irritation, with a slight burning sensation. Red blotching of the skin due to allergic reactions may occur. May be absorbed through the skin; symptoms may parallel inhalation.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

Chronic exposure may damage blood, lungs, central nervous system, liver and kidneys. p-Dichlorobenzene is a possible carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 66C (151F) CC

Combustible!

Explosion:

Above the flash point, explosive vapor-air mixtures may be formed. Contact with strong oxidizers may cause fire.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

75 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

10 ppm (TWA), listed as A3, animal carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, and engineering controls are not feasible, a full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White crystals.

Odor:

Moth-ball odor

Solubility:

Practically insoluble in water.

Specific Gravity:

1.25 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

174C (345F)

Melting Point:

53C (127F)

Vapor Density (Air=1):

5.08

Vapor Pressure (mm Hg):

10 @ 54.8C (131F)

Evaporation Rate (BuAc=1):

Not applicable.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizing agents, aluminum and its alloys.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 500 mg/kg; skin rabbit LD50: > 2 gm/kg; investigated as a tumorigen, mutagen, reproductive effector.

\Cancer Lists\			
Ingredient	NTP Known	Carcinogen Anticipated	IARC Category
p-Dichlorobenzene (106-46-7)	No	Yes	2B

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material may bioaccumulate to some extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(PARA-DICHLOROBENZENE)

Hazard Class: 9 **UN/NA: UN3077** Packing Group: III

Information reported for product/size: 5KG

International (Water, I.M.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(PARA-DICHLOROBENZENE)

Hazard Class: 9 UN/NA: UN3077 Packing Group: III

Information reported for product/size: 5KG

International (Air, I.C.A.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(PARA-DICHLOROBENZENE)

Hazard Class: 9 **UN/NA: UN3077**

Packing Group: Information reported for product/size: 5KG

15. Regulatory Information

Chemical Inventory Status - Part Ingredient		TSCA	EC	Japan	Austr	alia
p-Dichlorobenzene (106-46-7)				Yes		
\Chemical Inventory Status - Part	2\			 anada		
Ingredient			DSL	NDSL		•
p-Dichlorobenzene (106-46-7)				No		
\Federal, State & International Re	gulati -SARA RO	302-		l\ SAR st Che	A 313-	
Ingredient						
p-Dichlorobenzene (106-46-7)				3		
\Federal, State & International Re	gulati	ons -		2\ T		
Ingredient	CERCI			3 8 		÷
p-Dichlorobenzene (106-46-7)				N		
hemical Weapons Convention: No TSCA 12(b): No CDTA: Yes ARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No						

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

Reactivity: No (Pure / Solid)

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 2 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA.

Label Precautions:

Avoid breathing dust or vapors.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.

Keep container closed.

Use with adequate ventilation. Wash thoroughly after handling.

Keep away from heat and flame.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Benzene

ACC# 02610

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzene

Catalog Numbers: AC167660000, AC167660010, AC167660025, AC167660250, AC167665000, AC168650025, AC168650250, AC295330000, AC295330010, AC295330025, AC295330250, AC296880000, AC296880010, AC296880025, AC296880250, AC610230010, AC610231000, AC610510190, AC610510500, AC610511150, AC610512000, AC610710000, AC610710190, AC610710500, AC610711150, AC610712000, AC611001000, B243-4, B245-4, B245-500, B245J4, B411-1, B411-4, B412-1, B414-1, BP2601-100, S79920ACS

Synonyms: Benzol; Cyclohexatriene; Phenyl hydride.

Company Identification:

Fisher Scientific 1 Reagent Lane Fair Lawn, NJ 07410

For information, call: 201-796-7100 Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS	
71-43-2	Benzene	> 99	200-753-7	

Hazard Symbols: TF

Risk Phrases: 11 45 48/23/24/25

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless liquid. Flash Point: -11 deg C. **Danger!** May cause blood abnormalities. Cancer hazard. May cause central nervous system effects. Aspiration hazard if swallowed. Can enter lungs and cause damage. Extremely flammable liquid and vapor. Vapor may cause flash fire. Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye, skin, and respiratory tract irritation.

Target Organs: Blood, central nervous system, respiratory system, eyes, bone marrow, immune system, skin.

Potential Health Effects

Eye: Causes eye irritation.

Skin: Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.

Ingestion: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation: Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anem. Potential symptoms of overexposure by inhalation are dizziness, headac he, vomiting, visual disturbances, staggering gait, hilarity, fatigue, and other symptoms of CNS depression.

Chronic: May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and

other blood cell abnormalities. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumor composed of cells of the type normally found in the bone marrow). Immunodepressive effects have been reported. This substance has caused adverse reproductive and fetal effects in laboratory animals.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid. **Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Yash Point: -11 deg C (12.20 deg F)

Lutoignition Temperature: 498 deg C (928.40 deg F)

Explosion Limits, Lower: 1.3 vol %

Upper: 7.1 vol %

NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Approach spill from upwind. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, arks and flame. Avoid breathing vapor.

torage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to contrairborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1028 for the regulatory requirements for the control of employee exposure to benzene.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
	0.5 ppm TWA; 2.5 ppm STEL; skin - potential for cutaneous absorption		10 ppm TWA (apply only to exempt industry segments); 25 ppm Ceiling; 1 ppm PEL; 5 ppm STEL; 0.5 ppm Action Level (Cancer hazard,

OSHA Vacated PELs: Benzene: 10 ppm TWA (unless specified in 1910.1028)

Personal Protective Equipment Eyes: Wear chemical goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid Appearance: clear colorless

Odor: sweetish odor - aromatic odor

pH: Not applicable.

Vapor Pressure: 75 mm Hg @ 20 deg C

Vapor Density: 2.8 (air=1)
Evaporation Rate:Not available.
Viscosity: 0.647mPa @ 20 deg C
Boiling Point: 80.1 deg C

Freezing/Melting Point: 5.5 deg C

Decomposition Temperature:Not available.

Decomposition remperature. Not availab

Solubility: 0.180 g/100 ml @ 25°C

Specific Gravity/Density: 0.8765 @ 20°C

Molecular Formula:C6H6 Molecular Weight:78.11

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Conditions to Avoid: Ignition sources, excess heat, confined spaces. Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 71-43-2: CY1400000

LD50/LC50: CAS# 71-43-2:

permal, guinea pig: LD50 = >9400 uL/kg; aize test, rabbit, eye: 88 mg Moderate; Draize test, rabbit, eye: 2 mg/24H Severe; Draize test, rabbit, skin: 20 mg/24H Moderate;

Inhalation, mouse: LC50 = 9980 ppm; Inhalation, rat: LC50 = 10000 ppm/7H; Oral, mouse: LD50 = 4700 mg/kg; Oral, rat: LD50 = 930 mg/kg; Skin, rabbit: LD50 = >9400 uL/kg;

Carcinogenicity: CAS# 71-43-2:

ACGIH: A1 - Confirmed Human Carcinogen California: carcinogen, initial date 2/27/87 NIOSH: potential occupational carcinogen

NTP: Known carcinogen OSHA: Select carcinogen IARC: Group 1 carcinogen

Epidemiology: IARC has concluded that epidemiological studies have establ ished the relationship between benzene exposure and the deve lopment of acute myelogenous leukemia, and that there is sufficient evidence that benzene is carcinogenic to hum ans.

Teratogenicity: Inhalation, rat: TCLO = 50 ppm/24H (female 7-14 day(s) after conception) Effects on Embryo or Fetus - extra-embryonic structures (e.g., placenta, umbilical cord) and Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).; Inhalation,mouse: TCLo = 5 ppm (female 6-15 day(s) after conception) Effects on Embryo or Fetus - cytological changes (including somatic cell genetic material) and Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow).

Reproductive Effects: Inhalation, rat: TCLO = 670 mg/m3/24H (female 15 day(s) pre-mating and female 1-22 day(s) after conception) female fertility index (e.g. # females pregnant per # sperm positive females; # females egnant per # females mated).; Oral, mouse: TDLo = 12 gm/kg (female 6-15 day(s) after conception) Fertility post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).

Neurotoxicity: See actual entry in RTECS for complete information.

Mutagenicity: DNA Inhibition: Human, Leukocyte = 2200 umol/L.; DNA Inhibition: Human, HeLa cell = 2200 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 5 umol/L.; Cytogenetic Analysis: Inhalation, Human = 125 ppm/1Y.; Cytogenetic Analysis: Human, Leukocyte = 1 mmol/L/72H.; Cytogenetic Analysis: Human, Lymphocyte = 1 mg/L.

Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Mosquito Fish: TLm = 395 mg/L; 24 Hr; UnspecifiedFish: Goldfish: LC50 = 46 mg/L; 24 Hr; Modified ASTM D 1345Fish: Fathead Minnow: LC50 = 15.1 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Rainbow trout: LC50 = 5.3 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Bluegill/Sunfish: LD50 = 20 mg/L; 24-48 Hr; Unspecified If benzene is released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. If benzene is released to water, it will be subject to rapid volatilization. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation.

Environmental: If benzene is released to the atmosphere, it will exist predominantly in the vapor phase. Gasphase benzene will not be subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of 13.4 days. The reaction time in polluted atmospheres which contain nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4-6 hours. Benzene is fairly soluble in water and removed from the atmosphere in rain.

hysical: Products of photooxidation include phenol, nitrophenols, nitrobenzene, formic acid, and peroxyacetyl nitrate.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generate must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: CAS# 71-43-2: waste number U019 (Ignitable waste, Toxic waste).

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	BENZENE		•		BENZENE
Hazard Class:	3				3(9.2)
UN Number:	UN1114				UN1114
Packing Group:	11			· · ·	П
Additional Info:					FLASHPOINT -11 C

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 71-43-2 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

CAS# 71-43-2: 10 lb final RQ (receives an adjustable RQ of 10 lbs based on potential carc

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 71-43-2: acute, chronic, flammable.

Section 313

This material contains Benzene (CAS# 71-43-2, 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 71-43-2 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 71-43-2 is listed as a Hazardous Substance under the CWA. CAS# 71-43-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 71-43-2 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 71-43-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water

Act: WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzene, a chemical known to the state of California to cause birth defects or other reproductive harm. California No Significant Risk Level: CAS# 71-43-2: 7 æg/day NSRL

uropean/International Regulations European Labeling in Accordance with EC Directives Hazard Symbols:

ΤF

Risk Phrases:

R 11 Highly flammable. R 45 May cause cancer.

R 48/23/24/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 71-43-2: 3

Canada - DSL/NDSL

CAS# 71-43-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A, D2B.

Canadian Ingredient Disclosure List

CAS# 71-43-2 is listed on the Canadian Ingredient Disclosure List.

xposure Limits

AS# 71-43-2: OEL-AUSTRALIA:TWA 5 ppm (16 mg/m3);Carcinogen OEL-BEL GIUM:TWA 10 ppm (32 mg/m3);Carcinogen JAN9 OEL-CZECHOSLOVAKIA:TWA 10 mg/m3;STEL 20 mg/m3 OEL-DENMARK:TWA 5 ppm (16 mg/m3);Skin;Carcinogen OEL-FINLAND:TWA 5 ppm (15 mg/m3);STEL 10 ppm (30 mg/m3);Skin;CAR OEL -FRANCE:TWA 5 ppm (16 mg/m3);Carcinogen OEL-GERMANY;Skin;Carcinogen OEL-HUNGARY:STEL 5 mg/m3;Skin;Carcinogen OEL-INDIA:TWA 10 ppm (30 mg/ m3);Carcinogen OEL-JAPAN:TWA 10 ppm (32 mg/m3);STEL 25 ppm (80 mg/m3) ;CAR OEL-THE NETHERLANDS:TWA 10 ppm (30 mg/m3);Skin OEL-THE PHILIPPI NES:TWA 25 ppm (80 mg/m3);Skin OEL-POLAND:TWA 30 mg/m3;Skin OEL-RUSS IA:TWA 10 ppm (5 mg/m3);STEL 25 ppm (15 mg/m3);Skin;CAR OEL-SWEDEN:TW A 1 ppm (3 mg/m3);STEL 5 ppm (16 mg/m3);Skin;CAR OEL-SWITZERLAND;TWA 5 ppm (16 mg/m3);Skin;Carcinogen OEL-THAILAND:TWA 10 ppm (30 mg/m3);S TEL 25 ppm (7 mg/m3) OEL-TURKEY:TWA 20 ppm (64 mg/m3);Skin OEL-UNITE D KINGDOM:TWA 10 ppm (30 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KO REA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/11/1999 Revision #6 Date: 1/29/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users hould make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for y claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, nowsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: C2475 * * * * * Effective Date: 02/18/03 * * * * * Supercedes: 04/04/00

MSDS

Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Rod School Lane Phillipsburg, NJ 08865





24 Hour Emergency Telephone: \$08-859-2151 CHEMTREC: 1-800-424-9300

National Response in Canada CANUTEC: 613-096-6666

Outside U.S. and Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used city in the event of chemical emergencies involving a spill, loak, line, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CHLOROBENZENE

1. Product Identification

Synonyms: Monochlorobenzene; Chlorobenzol; Phenyl chloride; Benzene chloride

CAS No.: 108-90-7

Molecular Weight: 112.56 Chemical Formula: C6H5Cl

Product Codes:

J.T. Baker: 5153, 5163, 9179 Mallinckrodt: 4419, 4426

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Chlorobenzene	108-90-7	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 1 - Slight Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B

EXTINGUISHER.

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Affects central nervous system causing dizziness, incoordination and unconsciousness.

Ingestion:

Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Toxic! May cause systemic poisoning with symptoms paralleling those of inhalation.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain. May be slowly absorbed through the skin with possible systemic effects.

Eye Contact:

Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:

Prolonged or repeated skin exposure may cause dermatitis or skin burns. Prolonged or repeated exposure may cause liver, kidney, or lung damage.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, eye or central nervous system disorders, or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Fire Fighting Measures

Fire:

Flash point: 28C (82F) CC

Autoignition temperature: 593C (1099F) Flammable limits in air % by volume:

lel: 1.3; uel: 9.6 Flammable Liquid

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Reactions with incompatibles may pose an explosion hazard. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Combustion by-products include phosgene and hydrogen chloride gases.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers should be bonded and grounded for transfers to avoid static sparks. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL): 75 ppm (TWA)

-ACGIH Threshold Limit Value (TLV): 10 ppm (TWA)

CHLOROBENZENE Page 4 of 7

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Faint, almond like odor.

Solubility:

Insoluble in water.

Specific Gravity:

1.11 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

132C (270F)

Melting Point:

-45C (-49F)

Vapor Density (Air=1):

3.9

Vapor Pressure (mm Hg):

11.8 @ 25C (77F)

Evaporation Rate (BuAc=1):

1.1

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

CHLOROBENZENE Page 5 of 7

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizing agents, dimethyl sulfoxide, silver perchlorate, silver chromate.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

For Chlorobenzene: Oral rat LD50: 1110 mg/kg; Inhalation rat LC50: 2965 ppm. Investigated as a tumorigen, mutagen, reproductive effector.

\Cancer Lists\			
	NTP	Carcinogen	
Ingredient	Known	Anticipated	IARC Category
Chlorobenzene (108-90-7)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, CHLOROBENZENE

Hazard Class: 3 **UN/NA: UN1134** Packing Group: III

Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: CHLOROBENZENE

Hazard Class: 3 UN/NA: UN1134 Packing Group: III

Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: CHLOROBENZENE

Hazard Class: 3 **UN/NA:** UN1134 Packing Group: III

Information reported for product/size: 52L

15. Regulatory Information

\Chemi Ingredient	cal Invento	ry Status -	Part	1\	TSCA,	EC	Japan	Australia
Chlorobenzene	(108-90-7)				Yes	Yes	Yes	Yes
\Chemi	•.	ry Status -				Ca	anada	
Chlorobenzene	(108-90-7)			:	Yes	Yes	No	Yes
\Feder		Internatio	onal Re	-SARA	302-	,	SAR	A 313 mical Catg.
Chlorobenzene	(108-90-7)		· -	No	No	Yes	3	No
\Feder	al, State &			egulation	• •		- · · - T	
Chlorobenzene	(108-90-7)			100	- τ	J037	Ye	es

TSCA 12(b): No SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No Reactivity: No (Purè / Liquid)

Australian Hazchem Code: 2Y Poison Schedule: None allocated.

Chemical Weapons Convention: No

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 3 Reactivity: 0

Label Hazard Warning:

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

Label Precautions:

Keep away from heat, sparks and flame.

Avoid breathing vapor.

Keep container closed.

Wash thoroughly after handling.

Avoid contact with eyes, skin and clothing.

Use only with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: C4356 * * * * * Effective Date: 02/18/03 * * * * * Supercedes: 03/01/00



Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151 CHEMTREC: 1-800-424-9300

National Response in Canada CANUTEC: 613-998-6666

Outside U.S. And Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

Chromium Oxide

1. Product Identification

Synonyms: Chromium (III) Oxide; Chromic Oxide; Chrome Oxide Green

CAS No.: 1308-38-9

Molecular Weight: 151.99 Chemical Formula: Cr2O3

Product Codes: 1616

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Chromium (III) Oxide	1308-38-9	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate Flammability Rating: 0 - None Reactivity Rating: 1 - Slight Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:

Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

Prolonged or repeated skin contact may produce severe irritation or dermatitis.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eve Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Chromium Oxide Page 3 of 6

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Do not sweep. Damp mop any residue.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Do not store on wooden floors. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL): for Cr(III) compounds = 0.5mg/m3 (TWA)

-ACGIH Threshold Limit Value (TLV):

for Cr(III) compounds = 0.5 mg/m3 (TWA), A4 - Not classifiable as a human carcinogen

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eve Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Light to dark green Crystalline solid.

Odor:

Odorless.

Solubility:

Negligible (< 0.1%)

Specific Gravity:

5.10

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

4000C (7232F)

Melting Point:

2435C (4415F)

Vapor Density (Air=1):

Not applicable.

Vapor Pressure (mm Hg):

Not applicable.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

No information found.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Lithium, glycerol.

Conditions to Avoid:

Dusting.

11. Toxicological Information

Investigated as a tumorigen, mutagen.

12. Ecological Information

Chromium Oxide Page 5 of 6

Environmental Fate:

When released into the soil, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

\Chemical Inventory Status - Part 1\				
Ingredient	TSCA	EC	Japan	Australia
				Yes
\Chemical Inventory Status - Part 2\	<u>-</u>			
Ingredient	Korea	C DSL	anada NDSL	Phil.
Chromium (III) Oxide (1308-38-9)	Yes	Yes	No	Yes
\Federal, State & International Regulati -SARA Ingredient RQ	302-	 T 4	SAR	A 313
Chromium (III) Oxide (1308-38-9) No	No ,	No	Chr	omium com
\Federal, State & International Regulati Ingredient CERCL	.Δ	-RCRA	T	SCA-
Chromium (III) Oxide (1308-38-9) No		No	 N	o ,
Chemical Weapons Convention: No TSCA 12(b): SARA 311/312: Acute: Yes Chronic: Yes Fire: Reactivity: No (Pure / Solid)	No No P	CDTA ressu	: No re: No	

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

Chromium Oxide Page 6 of 6

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid breathing dust.

Keep container closed.

Use only with adequate ventilation.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: C4400 * * * * * Effective Date: 07/29/03 * * * * * Supercedes: 10/31/00



Material Safety Data Sheet

From: Mallinckrodt Baker, Inc. 222 Rod School Lane Phillipsburg, NJ 08865





24 Hour Emergency Telephone: 908-859-2151

National Response in Canada CANUTEC: 613-996-6666

Outside U.S. and Canada Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, it is, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CHROMIUM TRIOXIDE

1. Product Identification

Synonyms: Chromium (VI) oxide (1:3); chromic acid, solid; chromic anhydride

CAS No.: 1333-82-0 Molecular Weight: 99.99 Chemical Formula: CrO3

Product Codes:

J.T. Baker: 1637, 1638, 1639, 1642

Mallinckrodt: 2564, 2576

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Chromium(VI) Oxide (1:3)	1333-82-0	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE A FIRE. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. MAY CAUSE ALLERGIC REACTION. CANCER HAZARD. CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Cancer Causing)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer) Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES

Storage Color Code: Yellow (Reactive)

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Potential Health Effects

Inhalation:

Corrosive. Extremely destructive to tissues of the mucous membranes and upper respiratory tract. May cause ulceration and perforation of the nasal septum. Symptoms may include sore throat, coughing, shortness of breath, and labored breathing. May produce pulmonary sensitization or allergic asthma. Higher exposures may cause pulmonary edema.

Ingestion:

Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. May cause violent gastroenteritis, peripheral vascular collapse, dizziness, intense thirst, muscle cramps, shock, coma, abnormal bleeding, fever, liver damage and acute renal failure.

Skin Contact:

Corrosive. Symptoms of redness, pain, and severe burn can occur. Dusts and strong solutions may cause severe irritation. Contact with broken skin may cause ulcers (chrome sores) and absorption, which may cause systemic poisoning, affecting kidney and liver functions. May cause skin sensitization.

Eye Contact:

Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. May cause corneal injury or blindness.

Chronic Exposure:

Repeated or prolonged exposure can cause ulceration and perforation of the nasal septum, respiratory irritation, liver and kidney damage and ulceration of the skin. Ulcerations at first may be painless, but may penetrate to the bone producing "chrome holes." Known to be a human carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, asthma, allergies or known sensitization to chromic acid or chromates may be more susceptible to the effects of this material.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eve Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids

occasionally. Get medical attention immediately.

Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Will ignite on contact with acetic acid and alcohol. Releases oxygen upon decomposition, increasing the fire hazard.

Explosion:

Contact with oxidizable substances may cause extremely violent combustion. Containers may explode when involved in a fire.

Fire Extinguishing Media:

Use water, however, the decomposing material will form a hot viscous foam and caution should be exercised against the possibility of a steam explosion.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, ignition sources, moisture and incompatibilities. Do not store on wooden floors. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL):

For chromic acid and chromates, as CrO3 = 0.1 mg/m3 (ceiling)

- ACGIH Threshold Limit Value (TLV):

For water-soluble Cr(VI) compounds, as Cr = 0.05 mg/m3 (TWA), A1 - confirmed human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eve Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Dark red deliquescent solid.

Odor:

Odorless.

Solubility:

63g/100g water @ 20C (68F)

Specific Gravity:

2.7

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

Decomposes on melting

Melting Point:

197C (387F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Burning may produce chrome oxides.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Any combustible, organic or other readily oxidizable material (paper, wood, sulfur, aluminum or plastics). Incompatible with arsenic, ammonia gas, hydrogen sulfide, phosphorus potassium; sodium and selenium will produce incandescence. Corrosive to metals.

Conditions to Avoid:

Avoid excess heat and contact with combustible or organic materials.

11. Toxicological Information

Oral rat LD50: 80 mg/kg Investigated as a tumorigen, mutagen, reproductive effector.

\Cancer Lists\			
	NTP	Carcinogen	- ,
Ingredient	Known	Anticipated	IARC Category
Chromium(VI) Oxide (1:3) (1333-82-0)	Yes	No	1

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into water, this material is not expected to evaporate significantly. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS

Hazard Class: 5.1, 8 UN/NA: UN1463 Packing Group: II Information reported for product/size: 100LB

International (Water, I.M.O.)

Proper Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS

Hazard Class: 5.1, 8 UN/NA: UN1463 Packing Group: II

Information reported for product/size: 100LB

15. Regulatory Information

\Chemical Inventory Status - Part Ingredient		TSCA		Japan	Australia
Chromium(VI) Oxide (1:3) (1333-82-0)					Yes
\Chemical Inventory Status - Part	2\			 anada	
Ingredient	•	Korea			Phil.
Chromium(VI) Oxide (1:3) (1333-82-0)		Yes			Yes
\Federal, State & International Re					A 313
Ingredient	RQ	TPQ	Li	st Che	mical Catg.
Chromium(VI) Oxide (1:3) (1333-82-0)					omium com
\Federal, State & International R	egulati	ons -		2\ T	
Ingredient	CERCI		261.3	3. 8 	(d)
Chromium(VI) Oxide (1:3) (1333-82-0)			No	N	

Chemical Weapons Convention: No TSCA 12(b): Yes SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No Reactivity: Yes (Pure / Solid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2W

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 1 Other: Oxidizer

Label Hazard Warning:

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE A FIRE.

CHROMIUM TRIOXIDE Page 7 of 7

CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. MAY CAUSE ALLERGIC REACTION. CANCER HAZARD. CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Keep from contact with clothing and other combustible materials.

Do not get in eyes, on skin, or on clothing.

Do not breathe dust or mist from solutions.

Store in a tightly closed container.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Do not store near combustible materials.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

Prepared by: Environmental Health & Safety Phone Number: (314) 654-1600 (U.S.A.)

International Chemical Safety Cards

2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN

ICSC: 146











Dibenzo b,e 1,4dioxin, 2,3,7,8-tetrachloro-2,3,7,8-TCDD 2,3,7,8-Tetrachloro-1,4-dioxin $C_{12}H_4Cl_4O_2$ Molecular mass: 322

ICSC # 1467 CAS # 1746-01-6 RTECS # <u>HP3500000</u>

UN # 2811

November 26, 2003 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Chloracne. Symptoms may be delayed.	8 8	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (See Inhalation). Redness. Pain.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES	Redness. Pain.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Chemical protection suit including self- contained breathing apparatus.	Separated from food and feedstuffs.	R: S: UN Hazard Class: 6.1 UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1467

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN

ICSC: 1467

	MICHEORODIDENZO P DIC	
I	PHYSICAL STATE; APPEARANCE: COLOURLESS TO WHITE NEEDLE-LIKE	ROUTES OF EXPOSURE: The substance can be absorbed into the body by
M	CRYSTALS	inhalation of dust, through the skin and by ingestion.
P	PHYSICAL DANGERS:	INHALATION RISK:
О	CHEMICAL DANGERS:	Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be
R	The substance decomposes on heating to 750-800°C and	
Т	under the influence of UV light producing chlorine.	EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes, the skin and the
A	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV not established.	respiratory tract. The substance may cause effects on the cardiovascular system, gastrointestinal tract, liver,
N	MAK: 10-8 mg/m³; H; Peak limitation category: II(8); Carcinogen category: 4;	nervous system and endocrine system . The effects may be delayed.
T	Pregnancy risk group: C; (DFG 2003).	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
D		Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the bone
Α Α		marrow, endocrine system, immune system, liver and nervous system. This substance is carcinogenic to
Т		humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
A		
PHYSICAL PROPERTIES	Melting point: 305-306°C Density: 1.8 g/cm3	Solubility in water: none Vapour pressure, Pa at 25°C: negligible Octanol/water partition coefficient as log Pow: 6.8-7.02
	The substance is very toxic to aquatic organisms. This su	bstance may be hazardous in the

NVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to soil contamination. Bioaccumulation of this chemical may occur in fish,in plants,in mammals and in milk. It is strongly advised that this substance does not enter the environment.



NOTES

This chemical is only produced for research purposes, but could be generated as a by-product from chemical processes or fires.

Transport Emergency Card: TEC (R)-61GT2-I

ADDITIONAL INFORMATION

ICSC: 1467

2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE: Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

Material Safety Data Sheet

Naphthalene

ACC# 16120

Section 1 - Chemical Product and Company Identification

MSDS Name: Naphthalene

Catalog Numbers: AC164210000, AC164210010, AC164210025, AC180200000, AC180200010, AC180200050,

AC180202500, AC180900000, AC180900010, AC180902500, S76307, S763071, N134-500, N7-500 **Synonyms:** Coal tar camphor; Tar camphor; Naphthalin; White tar; Naphthene; Moth flakes: Moth balls.

Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100 Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
91-20-3	Naphthalene	>98	202-049-5

Hazard Symbols: XN N

Risk Phrases: 22

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white solid. Flash Point: 78 deg C. **Warning!** May cause blood abnormalities. Hygroscopic (absorbs moisture from the air). Flammable solid. May be harmful if absorbed through the skin. Harmful if inhaled or swallowed. Causes eye, skin, and respiratory tract irritation.

Target Organs: Blood, respiratory system, eyes, skin.

Potential Health Effects

Eye: Naphthalene is an eye irritant. The vapor causes eye irritation at 15 ppm. Eye contact with the solid material may result in conjunctivitis, superficial injury to the cornea, diminished visual acuity, and other effects. It may cause cataracts.

Skin: Causes mild skin irritation. May be absorbed through the skin in harmful amounts. Incidence of skin hypersensitivity is not widespread in the general population &, based on the long history of use of naphthalene as a consumer product, this effect is mostly confined to industrial exposure where coal tar contamination may be present.

Ingestion: Harmful if swallowed. May cause liver and kidney damage. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. May cause severe digestive tract irritation with abdominal pain, nausea, vomiting and diarrhea. Ingestion of large quantities may cause severe hemolytic anemia and hemoglobinuria.

Inhalation: Harmful if inhaled. Causes respiratory tract irritation. Readily absorbed when inhaled. Material volatilizes at room temperature. Hemolytic anemia (destruction of red blood cells) is the primary healt h concert for humans exposed to naphthalene for either short or long p eriods of time. Other effects may include nausea, profuse perspiration, vomiting, kidney damage and liver damage. Optic neuritis (inflammati on of the optic nerve) has been observed. Cataracts have also occurred.

Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage. May cause anemia and other blood cell abnormalities. Animal studies have reported that fetal effects/abnormalities may occur when maternal toxicity is seen. Effects may be delayed. Chronic exposure may cause lung damage. Laboratory experiments have resulted in mutagenic effects. Chronic exposure may cause corneal injury, optical cause vision, and possible cataract formation. Chronic inhalation, skin absorption or ingestion of aphthalene have caused severe hemolytic anemia.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid. **Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Individuals with a glucose-6-phosphate dehyrogenase deficiency are hypersensitive to the effects of naphthalene.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Flammable solid. Let's may be an explosion hazard if mixed with air at critical proportions and in the prescence of an ignition

usts may be an explosion nazard if mixed with air at critical proportions and in the prescence of an ignition Jurce. Volatile solid that gives off flammable vapors when heated.

Extinguishing Media: Water or foam may cause frothing. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Flash Point: 78 deg C (172.40 deg F)

Autoignition Temperature: 526 deg C (978.80 deg F)

Explosion Limits, Lower: 0.90 vol %

Upper: 5.90 vol.%

NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all sources of ignition. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust eneration and accumulation. Avoid breathing dust, vapor, mist, or gas. Avoid contact with eyes, skin, and othing. Keep container tightly closed. Use only with adequate ventilation.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Storage under a nitrogen blanket has been recommended. Store protected from moisture. Separate from oxidizing materials.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.



Exposure Limits

Γ	Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
	Naphthalene	10 ppm TWA; 15 ppm STEL; skin - potential for cutaneous absorption	10 ppm TWA; 50 mg/m3 TWA 250 ppm IDLH	10 ppm TWA; 50 mg/m3 TWA

OSHA Vacated PELs: Naphthalene: 10 ppm TWA; 50 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure. **Clothing:** Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Solid Appearance: white

Odor: Distinctive mothball-like.

pH: Not available.

Vapor Pressure: 0.05 mm Hg @ 20 deg C

Vapor Density: 4.4 (air=1)

Evaporation Rate:<1.0 (butyl acetate=1)

Viscosity: Not available. Boiling Point: 218 deg C

Freezing/Melting Point:79 - 82 deg C
Decomposition Temperature:540 deg C

Solubility: Insoluble.

Specific Gravity/Density:0.9900g/cm3

Molecular Formula:C10H8 Molecular Weight:128.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid: Ignition sources, dust generation, moisture, excess heat, exposure to moist air or water, steam.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information



CAS# 91-20-3: QJ0525000

LD50/LC50: CAS# 91-20-3:

Draize test, rabbit, eye: 100 mg Mild; halation, rat: LC50 = >340 mg/m3/1H;

ral, mouse: LD50 = 316 mg/kg; Oral, rat: LD50 = 490 mg/kg; Skin, rabbit: LD50 = >20 gm/kg; Skin, rat: LD50 = >2500 mg/kg;

Carcinogenicity: CAS# 91-20-3:

California: carcinogen, initial date 4/19/02

IARC: Group 2B carcinogen

Epidemiology: Incidents in which blankets or clothing containing naphthal ene caused acute hemolysis in infants, in some cases f atal, have been described. The percutaneous absorption and systemic intoxication with naphthalene can be facilitated by oily vehicles.

Teratogenicity: Naphthalene and its metabolites have been reported to cross the human placenta in amounts sufficient to cause fetal toxicity. Oral, rat: TDLo = 4500 mg/kg (female 6-15 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus) and Specific Developmental Abnormalities - other developmental abnormalities.; Intraperitoneal, rat: TDLo = 5925 mg/kg (female 1-15 day(s) after conception) Specific Developmental Abnormalities - musculoskeletal system and cardiovascular (circulatory) system.

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: Micronucleus Test: Human, Lymphocyte = 30 mg/L.; Cytogenetic Analysis: Hamster, Ovary = 30

mg/L.; Sister Chromatid Exchange: Hamster, Ovary = 15 mg/L.

Other Studies: Standard Draize Test: Administration onto the skin (rabbit) = 495 mg (Mild).; Standard Draize

Test: Administration int o the eye (rabbit) = 100 mg (Mild).

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 1.60 mg/L; 96 Hr; Flow-through at 15 CFish: Fathead Minnow: LC50 = 6.14 mg/L; 96 Hr; Flow-through at 24.5 CWater flea Daphnia: EC50 = 2.16-8.60 mg/L; 48 Hr; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 0.93 mg/L; 30 min; Microtox testFish: Pink salmon: LC50 = 1.24 mg/L; 96 Hr; (fry) Static bioassay at 12° C Releases into water are lost due to volatilization, photolysis, adsorption, and biodegradation. The principal loss processes will depend on local conditions but half-lives can be expected to range from a couple of days to a few months. When adsorbed to sediment, biodegradation occurs much more rapidly than in the overlying water column. When spilled on land, naphthalene is adsorbed moderately to soil and undergoes biodegradation. However, in some cases it will appear in the groundwater where biodegradation still may occur if conditions are aerobic.

Environmental: Bioconcentration occurs to a moderate extent but since depuration and metabolism readily proceed in aquatic organisms, this is a short term problem. transport and disposal of fuel oil, coal tar, etc. In the atmosphere, naphthalene rapidly photodegrades (half-life 3-8 hr). Naphthalene shows low biological oxygen demand and is expected to cause little O2 depletion in aquatic systems.

Physical: Log P (oct) = 3.01 - 3.59

Other: Harmful to aquatic life in very low concentrations.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

CRA P-Series: None listed.

CRA U-Series: CAS# 91-20-3: waste number U165.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	NAPHTHALENE, CRUDE				NAPHTHALENE
Hazard Class:	4.1		;		4.1
UN Number:	UN1334		•		UN1334
Packing Group:	III		•		111

Section 15 - Regulatory Information	nc
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US FEDERAL

TSCA

CAS# 91-20-3 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 91-20-3: Effective 6/1/87; Sunset 6/1/97

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 91-20-3: acute, chronic, flammable.

Section 313

This material contains Naphthalene (CAS# 91-20-3, 98%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 91-20-3 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer. California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives Hazard Symbols:

XN N

Risk Phrases:

R 22 Harmful if swallowed.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.

S 60 This material and its container must be disposed of as hazardous waste.

61 Avoid release to the environment. Refer to ecial instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 91-20-3: 2

Canada - DSL/NDSL

CAS# 91-20-3 is listed on Canada's DSL List.

Canada - WHMIS

This product does not have a WHMIS classification.

Canadian Ingredient Disclosure List

CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

CAS# 91-20-3: OEL-ARAB Republic of Egypt:TWA 10 ppm (50 mg/m3) OEL-AUSTRALIA:TWA 10 ppm (50 mg/m3);STEL 15 ppm (75 mg/m3) OEL-BELGIUM:TW A 10 ppm (52 mg/m3);STEL 15 ppm (79 mg/m3) OEL-DENMARK:TWA 10 ppm (50 mg/m3) OEL-FINLAND:TWA 10 ppm (50 mg/m3);STEL 20 ppm (10 mg/m3) OEL-FRANCE:TWA 10 ppm (50 mg/m3) OEL-GERMANY:TWA 10 ppm (50 mg/m3) OEL-HUNGARY:TWA 40 mg/m3;STEL 80 mg/m3;Skin OEL-THE NETHERLANDS:TWA 10 ppm (50 mg/m3) OEL-THE PHILIPPINES:TWA 10 ppm (50 mg/m3) OEL-POLAND:TW A 20 mg/m3 OEL-RUSSIA:STEL 20 mg/m3 OEL-SWITZERLAND:TWA 10 ppm (50 mg/m3) OEL-UNITED KINGDOM:TWA 10 ppm (50 mg/m3);STEL 15 ppm (75 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 5/14/1999 Revision #6 Date: 2/06/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



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NIOSH Publication 2005-149

September 2005

NIOSH Pocket Guide to Chemical Hazards

NPG Home Introduction Numbers Appendices S		<u>Name</u>	<u>es Cnemical Names C</u>	AS Numbers RTECS
Asbestos				CAS 1332-21-4
Hydrated mineral sili	cates	in in the second	ettimatoristoristoristoristoristo. Operanemoti ilimperi piranemi estabbili pelatine ili ustribi coloristi titu	RTECS <u>CI6475000</u>
Synonyms & Trade Names Actinolite, Actinolite asbe Anthophyllite, Anthophylli Tremolite, Tremolite asbe	te asbestos, Chrysotile			DOT ID & Guide 2212 <u>171</u> (blue, brown) 2590 <u>171</u> (white)
Exposure	NIOSH REL: Ca See	Арр	endix A See Appendix C	
Limits .	OSHA PEL : [1910.10	001] [[1926.1101] <u>See Appendi</u>	x C
ірі н Ca [N.D.] See: <u>IDLH</u>	INDEX	Conv	version	
Physical Description White or greenish (chryso	otile), blue (crocidolite)), or g	gray-green (amosite) fibro	us, odorless solids.
MW: Varies	BP: Decomposes		MLT: 1112°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Market Service (Market Service) and the service of	Sp.Gr: ?
FI.P: NA	UEL: NA		LEL: NA	
Noncombustible Solids				
Incompatibilities & Reactivit None reported	ies			
Measurement Methods NIOSH 7400, 7402; OSH See: NMAM or OSHA Me				
Personal Protection & Sanitation (See protection codes) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily First Aid (See procedures) Eye: Irrigate immediately Breathing: Fresh air				
Pesnirator Recommendation	ns (See Appendix E) N	JIOSE	THE PROPERTY OF THE PROPERTY HERE WERE AND THE PROPERTY SHOP THE PROPERTY OF T	

At concentrations above the NIOSH REL, or where there is no REL, at any detectable

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-

pressure-demand or other positive-pressure mode

concentration:

demand or other positive-pressure mode in combination with an auxiliary self-contained positivepressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. <u>Click here</u> for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]

Target Organs respiratory system, eyes

Cancer Site [lung cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0019

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APPENDIX B HEALTH AND SAFETY FORMS



TRAINING SESSION DOCUMENTATION RECORD

roject Name: roject Number: nstructor: Interial Covered:	Time: Sheet:	Start: Stop: 1 of
NAME (print)	SIGNATURE	COMPANY
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certify that the personnel above have been	n trained in the subject(s) listed i	n "Material Covered" as stated.
		y Environmental, Inc. Company Affiliation
structor Signature	Instructor's	Company Affiliation



SUBCONTRACTOR AFFIDAVIT

I have reviewed the Site Health and Safety Plan for the Standard Chlorine Chemical Company (SCCC) Site and understand the potential health and safety hazards at this operation and the emergency response procedures. I agree to conduct all on-site work in conformity with the requirements of the Health and Safety Plan.

Project Number:

Date:

NAME (print)	SIGNATURE	COMPANY
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Site Supervisor



Case #	
	Page 1 of 2

INCIDENT AND INJURY REPORT

This form must be completed and forwarded to Corporate Health and Safety within 24 hours of any incident/injury. For serious injuries, also complete page 2 and forward the entire form to Corporate Health and Safety by the end of the day.

Employer Address:	
<u> </u>	
Employer Phone #	Employers FAX #
2Employer Filone, ii	Limployers I AA#
En	MPLOYEE
Name:	Soc. Sec. #
Home Address:	
County:	Zip Code:
Home Telephone:	Date of Birth: Age:
Occupation: (Job Title):	Sex: Male Female
Department:	Married: Yes □ No □
How long employed: Years Mo.	No. Children under 18 yrs.
	DENT/INJURY
Project Name:	Project Number:
Address of Accident:	<u> </u>
County:	Zip Code:
Was accident on company property: Yes \(\Delta\) No \(\Delta\)	Zip Code:
Date and Time of Injury:	Date Reported:
	c – include tools, equipment, materials, or objects involved):
	in the state of th
How did the injury occur? (Describe the event that res	sulted in injury):
Dodu Dodinio do do do Cirio (Do Cirio)	
Body Part injured and nature of injury (Be specific):	
Name of object or substance that directly injured the	mployee
Traine of object of substance that directly injured the e	mpioyee.
N	TEDICAL
First aid given by:	IEDICAU
Date of medical assistance:	Was accident fatal?
Name of medical provider:	
Address of medical provider:	
Diagnosis:	
If hospitalized, name and address of hospital:	
EMPLOYEE'S SIGNATURE:	
PREPARER'S SIGNATURE:	Date:
SUPERVISOR'S SIGNATURE:	Date:
HEALTH & SAFETY SIGNATURE:	Date:
	Date.



INCIDENT AND INJURY REPORT

	ACCIDENT INVESTIGATION AND FOLLOW-UP
Provide additional informa	tion on what the employee was doing and how the injury occurred:
	
Witness names (also addre	sses and phone numbers if not company personnel):
What did the employee do	or fail to do that caused or contributed to the accident?
Wiles and a second second	4
What caused or influenced	the unsare act?

What condition of tools, ed	quipment or the jobsite caused or contributed to the accident?
What caused or influenced	the unsafe condition?
What action has been taken	or is planned to prevent recurrence?
,	
Person(s) responsible for c	ompletion of the action:
,	
Target date:	Actual completion date:
Completed by:	
	OFFICE USE ONLY
	Medical □ Restricted or Job Transfer □ Days Away from Work □
OSHA Recordable: Yes	□ No □
Worker's Comp Claim F	iled: Yes □ No □ Date Filed:
Project Manager:	
Date lost work time began	K:
Total days away from world	\mathbf{C}
Date of restricted activity of	
Total restricted/job transfer	r workdays:
Date returned to full duty:	



REAL-TIME MONITORING INSTRUMENT CALIBRATION LOG

Project Number:
Serial Number(s):

DATE	TIME	READING	CALIBDATED DV	COMMENTS
DITTE		KLADING	CALIDRATED DI	COMMENTS
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REAL-TIME MONITORING LOG

Date:		Person performing sampling:						
Project N	Name:	1	Signature:					
Project N	No.:						,	
Time	Monitoring Location (be specific)	O ₂	LEL %	REA NH ₃ ppm	DINGS Dust mg/m	Noise dB	Detect or Tube (spec: tube)	COMMENTS (Where was sample taken? e.g., breathing zone or other) and Duration of Monitoring
			:					
						-		
							-	
						-		·

Real Time Instrument Calibration Log should accompany this form.



APPENDIX C

EMERGENCY CONTACTS AND HOSPITAL ROUTE MAP



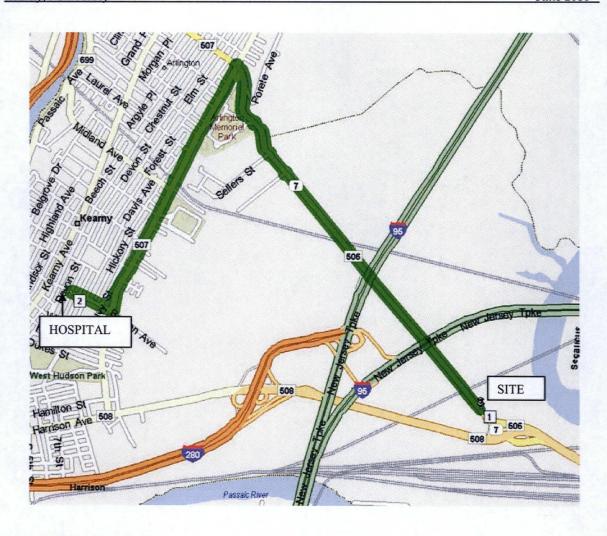
Service)

Public Service Electric and Gas

EMERGENCY NUMBERS Standard Chlorine Chemical Compa Kearny, NJ	my Site			
Fire	911			
Police	911			
Ambulance	911			
HOSPITAL - West Hudson Hospital 206 Bergen Ave. Kearny, NJ 07032	(201) 955-7040 (emergency)			
Poison Control Center	(800) 222-1222			
Key Environmental, Inc Health & Safety - John Francis	(412) 279-3363 (412) 527-1644 (c)			
DIRECTIONS TO EMERGENCY I	ROOM			
West Hudson Hospital (201) 995-7000 206 Bergen Avenue Kearny, NJ 07322				
Turn right onto Belleville Pike and follow west to Schuyler Avenue (near the cemetery), Turn left onto Schuyler Avenue at the cemetery, Follow Schuyler to Bergen Avenue, Turn right onto Bergen Avenue and follow approximately two blocks to the hospital. Approximately 4 miles (10 minutes) to hospital.				
UTILITY NUMBERS				
Call Before You Dig (Garden State Underground Plant Location	800-272-1000			



800-436-7734



West Hudson Hospital (201) 995-7000 206 Bergen Avenue Kearny, NJ 07322

Turn right onto Belleville Pike and follow west to Schuyler Avenue (near the cemetery), Turn left onto Schuyler Avenue at the cemetery, Follow Schuyler to Bergen Avenue,

Turn right onto Bergen Avenue and follow approximately two blocks to the hospital. Approximately 4 miles (10 minutes) to hospital.

